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AN INVESTIGATION OF CERTAIN USES OF A TEST
CONSTRUCTED ACCORDING TO PRINCIPLES
OF TRANSFORMATIONAL GRAMMAR

by

RONALD WARDHAUGH

A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance a thesis entitled AN INVESTIGATION OF CERTAIN USES OF A TEST CONSTRUCTED ACCORDING TO PRINCIPLES OF TRANSFORMATIONAL GRAMMAR, submitted by RONALD WARDHAUGH in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

ABSTRACT

A test, constructed by the investigator and based upon the principles of transformational grammar, was used in junior and senior high school classes to investigate the following hypotheses:

1. There is a close relationship between grammatical ability and composition ability, particularly when this relationship is examined with a test based upon the principles of transformational grammar.
2. Language ability varies with both age and intelligence at the high school level.
3. An analysis of the responses by students on a test based upon the principles of transformational grammar contributes some empirical support to the underlying grammatical theory.

In the construction of the Transformational Grammar Test from three of the existing sketches of the transformational grammar of English, the analogical principle was used in the writing of the individual test items. The Transformational Grammar Test and standardized tests of traditional grammar, analogies and composition were given to groups of students matched by grade level (X, XI and XII) and by ability level (high, mid and low). Groups of grade VIII students, matched to the groups of grade X students, were also given the Transformational Grammar Test. The resulting test scores were subjected to two types of statistical analysis: correlation and two-way analysis of variance.

Within the senior high school grades the scores on the four

tests correlated positively with each other and yielded r coefficients ranging from 0.51 to 0.58. Because the relationship between the scores on the Transformational Grammar Test and the scores on the Essay Test was significantly non-linear, it was necessary to calculate an eta coefficient (0.64). However, neither the r nor eta correlations between the scores on the Transformational Grammar Test and the scores on the Essay Test were significantly higher than the similar correlations between the scores on the Traditional Grammar Test and the scores on the Essay Test. Therefore, the Transformational Grammar Test neither demonstrated any very close relationship between grammatical and composition ability nor any closer relationship than did the Traditional Grammar Test.

The two-way analysis of variance revealed that for the Traditional Grammar Test, the Analogies Test and the Essay Test, both grade and ability level differences were significant within the senior high school grades. Consequently, performance on these tests varied by both age and intelligence at the senior high school level. With the Transformational Grammar Test, only the ability level differences were significant for the test total and seven of the eight subtests. However, significant grade level differences were revealed, in addition to ability level differences, when the grade VIII students were included in the analysis. It appears that the Transformational Grammar Test either measured an ability which had ceased to increase in the senior high school grades and which was related to intelligence rather than chronological age or years in school, or that an artifact of the test prevented an assessment of such an increase.

The responses of the senior high school students to the

items of the Transformational Grammar Test showed that they experienced difficulties arising from both item construction and the grammar. In addition, all the students in the investigation experienced the greatest degree of difficulty with the manipulation of combinations of the passive, negative and question transformations. It also proved possible to select fourteen items which differentiated significantly between high and low ability level senior high school students. On the other hand, the responses showed that even grade VIII students readily distinguished between adjectives and nouns as modifiers of nouns.

The findings of the study indicate that a grammar test based on the theory of transformational grammar fails to reveal any closer connection between grammatical ability and composition ability than does a grammar test based on traditional grammar. This is not to say that there is no close connection, since this investigation was deliberately limited by the facts that the students were unfamiliar with transformational grammar, that the test itself was limited in its sampling and construction, and that the sample population was small and rigidly stratified. However, there was some evidence that the ability to manipulate grammar, as opposed to the ability to manipulate a metalanguage, may reach a plateau at the senior high school level with differential performance related to intelligence rather than chronological age. This finding suggests that if grammar is to be taught at all at the senior high school level, then it should perhaps be taught to students grouped by ability level rather than grade level. The findings concerning the difficulties which students experienced with the items of the Transformational Grammar Test confirm

certain similar findings by other investigators, e. g. concerning the difficulties created by the manipulation of passive transformations, and also lend some empirical support to the underlying grammatical theory in that a high percentage of student responses agreed with the underlying theoretical model.

The study concludes with suggestions for further possible investigations which might result from this tentative approach to using the theory of transformational grammar in studies of grammatical ability and language development.

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CHAPTER I

NATURE OF THE STUDY

1. BACKGROUND

Men seem always to have been interested in language: the book of Genesis advances a theory about the origins of language; the Greeks debated the essential nature of language; philologists have considered the various processes of language change; both philosophers and linguists have discussed the possibilities of language universals; and educators have explored a variety of methods of teaching both first and second languages. Today, the study of the English language is an integral part of the curriculum in our schools and much of the English teacher's work is directed towards the improvement of his students' ability to use their native language, particularly in writing.

In their endeavors to improve students' ability, teachers devote much time and effort to the teaching of English language and a large proportion of that time and effort is expended on one part of this teaching, the teaching of English grammar. Consequently, it would be well to indicate some of the assumptions which apparently underlie the teaching of so much grammar.

1. The first assumption is that actual study of the native language will lead to improvement in the effective use of the language. Indeed for many people, educators and critics of the schools alike, one of the principal reasons for teaching English as language is a quite utilitarian one. The result is that English is hardly ever to be studied as an end in itself but always as a means to an end. Consequently, students are required to learn about the language on the assumption that learning

about the language will lead to improvement in the ability to use the language, that understanding is basic to application. It is often assumed that if students learn grammatical rules, definitions of the parts of speech, sentence types, and the trouble spots of English grammar, they will write better sentences, paragraphs and essays.

2. The second assumption is that learning about language is cumulative, that new learning builds on old learning, and that, in turn, the new learning prepares students for further learning. The current year's work in grammar, then, should build on last year's and prepare for next year's. The assumption is that after several years of grammatical study the students' knowledge of grammar will accumulate and lead to improved ability to apply the increasingly conscious knowledge in writing.
3. The third assumption is that students who do not use the language well, particularly those who write poorly, can improve in this ability if they are required to study about language or grammar for an even greater time and even more intensively than students who use language well. It is assumed that such extra study, of the kind found in many remedial English texts, will raise the level of linguistic performance of these students towards the level of performance of the superior students.
4. The fourth assumption is that everyone knows what grammar is. It is widely assumed that there is one grammar for English (usually called "traditional grammar"), that this grammar, inherited from Greece and Rome, is sound, and that it is adequate for nearly all purposes for which it might be required. Even when traditional grammar proves to be slightly less than

adequate, this inadequacy is held to be the fault of the English language rather than of the grammar.

5. The fifth assumption is that it is possible to estimate students' knowledge of, and ability with, language quite accurately, i.e. that the grammar and composition tests in general use are both valid and reliable.

A reading of the literature on the teaching of English and of English texts themselves would confirm that these assumptions underlie much of the work done in grammar in the classroom by many English teachers. However, this work, this expenditure of time and effort, has not achieved the results hoped of it. Our schools are still criticized for producing graduates who cannot communicate, who can neither read nor write effectively. Perhaps the reason is that English teachers are still not doing enough, are still not devoting a sufficiently large proportion of time and effort to work on grammar, or, perhaps, misled by a set of wrong assumptions, they are doing quite the wrong things. Knowledge about the English language may not lead to an increase in ability to use the English language; the study of grammar may not lead to cumulative learning, but instead may be repetitious and boring, particularly if students believe such study has little to offer them in increasing their understanding of the language as they really use it; the study of grammar may be more harmful than helpful to those students who have difficulty in using the language effectively; the emphasis on one particular kind of grammar, traditional grammar, may be either misplaced or misleading; and, with current testing instruments, it may not even be possible to assess real language ability at all, as opposed to knowledge about language.

As will be indicated in Chapter II, several decades of research have produced certain conclusions which do not support some of the five

assumptions. For example, the assumption that a knowledge of traditional grammar is closely related to ability in composition is not supported nor is the assumption that students who score low on ability tests can benefit a great deal from the study of grammar. Other evidence from the literature suggests that traditional grammar is repetitious and boring rather than cumulative and stimulating. Then, in addition, traditional grammar has been shown by linguists to be a poor grammatical model for English and essay tests have been shown to be quite unreliable. These last facts, the basic weakness of traditional grammar and the unreliability of assessments of composition ability, make the validity of most grammar tests and studies of the relationship of grammatical knowledge to composition ability quite suspect; consequently, the actual validity of the research evidence itself may be questioned. A better grammatical theory than traditional grammatical theory and better methods of assessing composition ability might even produce quite different conclusions.

Language development studies are vitiated by some of the same problems and assumptions. There is a long history of such studies and underlying most of them is the assumption that traditional grammar provides an adequate description of English. Consequently, most investigators have accepted the traditional description unhesitatingly and have proceeded to relate the development of language ability in children to a description of adult language, a description which is not only inaccurate but quite misleading at times.

For example, most investigators have not been clear about either the important distinctions to be made between speech and writing or the important relationships between the two because traditional grammar has tended to ignore speech. Today we know that speech is primary and writing secondary, because writing is a representation

of speech.

Therefore, studies of phonological development which have ignored this relationship, or misunderstood it, for example by expressing a concern with the correct pronunciation of letters, must be suspect, as must studies of grammatical development in which the investigators have failed to recognize that some of the most important grammatical signals of speech, such as stress, juncture and pitch, are but poorly represented in writing. Even the very fact that children already have internalized much of the grammar of their language when they first come to school, or else they could not even communicate with their teachers, would seem to have escaped the attention of some investigators. Certain of these seem actually to have been more concerned with the development of control of a metalanguage, i.e. a language about language, than with the development of language itself.

Because the traditional description of English grammar is not very appropriate, many of the language development studies have serious weaknesses. However, this is not to say that they are completely invalid or worthless for such is not the case. As will be indicated in Chapter II, these studies have revealed many important characteristics of development. The main criticism is that the grammatical model on which they are based strictly limits the characteristics such studies might discover and often distorts these characteristics in the very act of discovery.

The traditional grammatical model is weak because it is based on a theory of English grammar which has serious shortcomings. The theory is derived from a grammatical model suitable for Greek and Latin, and those people who use it for English are forced to try to describe English within an entirely unsuitable theory. The result is that English is described as though it were Latin or a language like Latin.

Consequently, distinctions are sometimes given to English grammar which do not exist, for example distinctions such as objective and dative case in nouns. On the other hand, distinctions which do exist, such as important word order patterns, are generally either completely ignored or passed over with little or no acknowledgment made of their importance.

In recent years those people concerned with the English language -- its description, its development in children, its teaching -- have been provided with better grammatical models than the traditional one for their various purposes. The development of the discipline of linguistics in the late nineteenth century and early twentieth century has led linguists in the past two decades to make fresh theoretical approaches to English grammar. Most linguists were quick to point out the weaknesses of traditional grammar and demonstrate its shortcomings, but instead of replacing traditional grammatical theory with one new grammatical theory, they have produced two types of theory, first structural or descriptive theory and, very recently, transformational theory.

The development of structural theory by the structural linguists led to the writing of several interpretations of the grammar of English, not just a single interpretation; however, all these interpretations, or grammars, share certain characteristics. All are inductive and formal: a certain group of words behaves in a certain way, i.e. takes a certain series of inflectional endings or fills a certain slot in a pattern, therefore its members constitute a word class. Likewise, all the grammars are based on similar assumptions about language: that language is primarily speech; that there are various levels to the system of a language -- phonological, grammatical and semantic; that there are certain universals in languages such as phonemes and morphemes; and that all languages have unique systems.

The new structural grammars of English and the concern of linguists with description and induction opened up again the possibilities both of teaching grammar to improve composition ability and of estimating student competence in English grammar. As will be shown in Chapter II, the teaching of structural grammar has led, it is claimed, to greater student enthusiasm for learning grammar than did the teaching of traditional grammar and even to some improvement in writing ability. The approach too to teaching the grammar, an approach which required students to examine language for themselves, to inquire into relationships and patterns, and to investigate how language is actually used, also tended to differ from the old approach to teaching traditional grammar, in which rules and definitions were arbitrary and absolute and were to be learned rather than discovered by students. In language development studies too, an emphasis on descriptions of language at various stages of development became noticeable as did the clearcut differentiation between studies of speech development and writing development. As will be shown in Chapter II, the studies of language development based on structural grammar have been particularly enlightening even though they have been almost exclusively carried out with young children.

The assumptions basic to structural theory have, however, been questioned recently by proponents of the newest linguistic theory, transformational theory. Transformational theorists criticize structural theory for its paramount concern with taxonomy, data-cataloguing and analysis. The structural linguists are said to be competent describers of the exterior patterns or systems of languages but are criticized for not pushing beneath that exterior into the inner workings of the systems. The counter-argument of the structural linguists is that to attempt to do this would be to show a concern for

mentalism, for sheer speculation, and that the whole history of modern linguistics has been away from such a concern.

The transformational theorists propose for each language a grammatical model which is dynamic rather than static, generative rather than taxonomic, and synthetic rather than analytic. The theorists claim that transformational grammars may be so organized that grammatical relationships can be demonstrated in ways that structural theories are powerless to demonstrate. Moreover, they say that the grammars also show how an infinite number of sentences may be generated beyond any finite initial corpus. The theory, then, accounts for both the closed system of any language yet that system's essential open-endedness, i.e. it accounts for people being able to understand sentences which almost certainly have never before been uttered. Furthermore, the transformational theorists say that the theory demonstrates how sentences are synthesized, combined and rearranged in transformations. It is even claimed by some of the theorists that such a grammatical model of any language may be said to simulate how speakers of that language actually produce sentences. Thus the transformational theorists often appear to be more interested in how sentences are produced and understood than in merely describing those sentences which have been produced at a particular time, and in this interest they differ essentially from the structural linguists.

II. PROBLEM

The formulators of transformational theory, the most recent of the three grammatical theories, claim that it is the most insightful or "powerful" theory. It is powerful because it explains more grammatical relationships and intuitions, and does this more economically, than either of the other theories. Obviously transformational

theory must be further investigated and developed to see if it fulfills such sweeping claims.

It seems that the theory might well be put to use in further investigations of some of the problems of language teaching and language development mentioned in the first part of the chapter in order to test further some of the underlying assumptions. It has already been indicated that the traditional theory of grammar has not proved to be as useful as was sometimes hoped. The structural theory of grammar was also shown to have certain limitations. Therefore, there is an urgent need to use transformational theory to reinvestigate problems for which the other theories have proved to be either inappropriate or inadequate.

One such problem already mentioned is that of the relationship of the grammatical ability of students to their composition ability. If transformational theory does provide us with the most insightful description of English grammar that we have, then we need a test of grammatical ability based on that theory, a Transformational Grammar Test. Such a test, which might sample parts of transformational grammar in its various subtests, might be used to re-examine the relationship between grammatical ability and composition ability as measured on the best available Essay Test. It seems reasonable to assume that in order for students to write well they must be able to control the grammatical structure of their language and, therefore, a grammar test which seeks to test this control rather than the control of a falsely oriented metalanguage, i.e. traditional grammar, should produce scores which have a high positive correlation with essay writing scores.

Then, in addition, the relationship of scores on both these tests, a Transformational Grammar Test and an Essay Test, to scores on

a widely used Traditional Grammar Test would also be worth investigating to discover whether or not a Transformational Grammar Test, because it may be based on a more insightful theory, actually is a better indicator of composition ability, as evidenced on an Essay Test, than is a Traditional Grammar Test based on what may be a less adequate theory. An even better indication of the use of a Transformational Grammar Test as a predictor of composition ability would be possible if the students to be tested had been taught traditional grammar rather than transformational grammar. In such a situation one would assume that a Traditional Grammar Test would give the better indication of composition ability. If the opposite were true, there would be a particularly strong argument for both using transformational grammar in such a test and teaching the grammar to students. This investigation of relationships would be best conducted at the senior high school level since it is at this level that essay writing, as opposed to sentence and paragraph writing, is stressed in most English curricula.

English grammar, however, is taught throughout the secondary school grades in an attempt to improve the English expression of students. As has already been indicated, it is assumed that ability to deal with grammatical concepts develops on a fairly regular incremental basis, just as it is assumed that other abilities, such as composition ability, develop over the years in school. It would, therefore, seem reasonable to assume that all three tests (a Transformational Grammar Test, a Traditional Grammar Test, and an Essay Test) would show increases in the abilities they measure if the tests were given to students grouped according to grade level (X, XI and XII) in the senior high school. Should such increases not be recorded for one or more tests this could indicate either that the particular ability or abilities measured cease to develop at some point during this time or that the test or tests have

certain limiting features that may require further study.

Performance in school does not vary only with grade level; ability level is also widely held to be an important determiner of performance in most academic subjects. Generally students who score low on ability tests are expected to perform less well in most tasks than those students who make neither low nor high scores, and they, in turn, less well than those students who score high. It would also be of interest, then, to discover how senior high school students grouped by ability level (high, mid and low), as well as by grade level, perform on the three tests. It might, then, be possible to see whether ability level differences are more important than grade level differences within the senior high school, whether the performances on all tests are consistent with each other, and whether any test reveals a different pattern of performance from the others.

Since the senior high school grades contain only a narrow developmental span, and linguists have often expressed the opinion that children of school age already know the grammar of their language, it would also seem desirable to compare grade and ability level performances on a Transformational Grammar Test across a wider span than the senior high school years. Consequently, it would be desirable to include a junior high school grade (VIII) to increase the developmental span. The inclusion of the junior high school students would provide for a more accurate estimate of grade and ability level differences if, for example, grade XII students did not perform significantly better than grade X students.

In the making of any test there arise problems of item selection and test construction. So that all the items of a Transformational Grammar Test might be consistent with each other and unnecessary variables be excluded, it seems desirable that all the

items be of one kind, for example that all be analogies. The effect of the exclusive use of analogy could then be gauged by requiring all students to take an additional Analogies Test. The scores on this test could then be compared with the scores on the other three tests and some estimate made of the influence of this exclusive use of analogy.

Finally, the answers of different groups of students to the individual items and subtests of the Transformational Grammar Test might be expected to contribute some further understanding of both the nature of such groups and of the underlying grammatical theory itself, for example as to assumptions about relative difficulty or the ordering of statements in transformational grammar. Likewise, the responses to all tests might be expected to point towards certain possible improvements in classroom procedures.

III. SIGNIFICANCE OF THE STUDY

Transformational theory may prove to have many practical uses in the classroom, but the theory will only be useful if deliberate attempts are made to develop it in specific ways. The present study, therefore, seeks to make a significant contribution to developing present knowledge by using transformational grammar:

1. to re-examine the old problem of the relationship of grammatical ability to composition ability;
2. to investigate some aspects of language development in children at the secondary school level where there has been but little work using newer grammatical theories; and
3. to discover what the responses of students to questions on grammar might reveal about the nature of that grammar.

In this way it is hoped that significant insights may be gained into ability in grammar and composition, into language develop-

ment during adolescence, and into classroom applications of the theory of transformational grammar.

IV. HYPOTHESES

The study is designed to investigate the following hypotheses:

1. There are positive correlations among the scores on the following tests: a Transformational Grammar Test, a Traditional Grammar Test, an Analogies Test and an Essay Test, when these tests are given to senior high school students grouped by grade and ability level.
2. A Transformational Grammar Test is a better indicator of composition ability than is a Traditional Grammar Test in the senior high school grades.
3. All tests (a Transformational Grammar Test, a Traditional Grammar Test, an Analogies Test and an Essay Test) and the subtests of a Transformational Grammar Test differentiate among students in the senior high school by both grade and ability level.
4. A Transformational Grammar Test and its subtests differentiate among students in the junior and senior high school grades by both grade and ability level.

For the purposes of the investigation these four major hypotheses were phrased in terms of the series of null hypotheses which follows. An additional hypothesis, that a Transformational Grammar Test might be used to gain some further insights into the nature of transformational grammar, was not made the subject of a null hypothesis.

Null Hypotheses

1. There are no significant relationships among the abilities measured by the Transformational Grammar Test, the Traditional

Grammar Test, the Analogies Test and the Essay Test:

- a. for all students in grades X, XI and XII;
 - b. for students within each of three grade levels, X, XI and XII;
 - c. for students within each of three ability levels, high, mid and low, in grades X, XI and XII.
2. The correlation between scores on the Transformational Grammar Test and scores on the Essay Test is not significantly higher than the correlation between scores on the Traditional Grammar Test and scores on the Essay Test.
 3. On the Traditional Grammar Test, the Analogies Test and the Essay Test there are no significant differences in the performances of all students in grades X, XI and XII:
 - a. by grade level;
 - b. by ability level.
 4. On the Transformational Grammar Test and each of its subtests there are no significant differences in the performances of all students in grades X, XI and XII:
 - a. by grade level;
 - b. by ability level.
 5. On the Transformational Grammar Test and each of its subtests there are no significant differences in the performances of all students:
 - a. in grades VIII, X, XI and XII;
 - i. by grade level;
 - ii. by ability level;
 - b. in grades VIII and X;
 - i. by grade level;
 - ii. by ability level.

V. LIMITATIONS

The study is limited in the following ways:

1. The study does not attempt to measure the reading ability of the students or the readability of the various tests. However, the Transformational Grammar Test was deliberately kept free of low frequency words.
2. The study does not attempt to measure oral language ability even though such ability has been shown to relate closely to other kinds of language ability.
3. The study does not attempt to investigate possible sex and socio-economic differences. Sex differences were controlled in the matching of groups by grade and ability level; socio-economic differences appear to be closely related to ability differences and the latter rather than the former were chosen as the preferred criteria for matching groups in this investigation.
4. The study does not attempt to investigate the teaching of transformational grammar. Though the investigation was concerned with the possible use of transformational grammar in schools, the concern was with the function of such grammar within a grammar test and the success of such a test in indicating language and writing ability and not with the effects of teaching the grammar on certain abilities.
5. Finally, the investigation is limited by the fact that the population involved was almost entirely from one senior high school in Edmonton, Alberta. All generalizations should be evaluated in the light of this limitation.

VI. ORGANIZATION OF THE STUDY

The remainder of the study is organized in the following way:

Chapter II contains a review of studies related to the problem and some substantiation of the assumptions presented in the first section of this chapter. In Chapter II the different grammatical theories are briefly described and the current state of knowledge of the relationship of grammatical ability and composition ability examined. Some indication is also given of the main concerns that investigators have shown in studies of language development; here the emphasis is on the kinds of studies and techniques used in the studies. Finally, the chapter concludes with a brief examination of some factors related to language ability.

Chapter III reports on the selection of subjects for the investigation, the matching procedures for groups, the selection, validation and reliability of the test instruments, and the general procedures of the investigation.

Chapter IV deals with the investigation of relationships among the tests and the first two hypotheses. Chapter V deals with the differences in performance by grade and ability levels and with the third and fourth hypotheses. The fifth hypothesis is the subject of Chapter VI.

Chapter VII, the concluding chapter, contains a summary of the main findings together with certain implications for teaching and testing and suggestions for further investigations.

CHAPTER II

REVIEW OF RELATED LITERATURE

I. GRAMMARS

A grammar may be defined as a theory of the properties of a language. Currently there are three main theoretical systems advanced for the English language: traditional grammar, structural grammar, and transformational grammar.

Traditional Grammar

In his Ancient & Mediaeval Grammatical Theory in Europe¹ Robins has traced the development of the grammatical theory which has become known in our society as traditional grammar. Much of this grammatical theory was originally devised by the Greeks and developed by the Romans in order to discuss their languages within the prevailing philosophical systems. Consequently, the theory tends to reflect philosophic and semantic concepts rather than linguistic and formal concepts. For example, the traditional grammarian usually says that nouns are "naming" words and verbs are "action" words and uses extra-linguistic semantic criteria rather than linguistic formal criteria for definition.

Robins, Pooley², Dykema³, and Hartung⁴ have described how such a theory was gradually adopted in modern times for the English language and how it has generally been used as the basis for all aspects of English

¹R. H. Robins, Ancient & Mediaeval Grammatical Theory in Europe (London: G. Bell and Sons, Ltd., 1951).

²R. C. Pooley, Teaching English Grammar (New York: Appleton-Century-Crofts, Inc., 1957).

³K. W. Dykema, "Where Our Grammar Came From," College English, XXII (April, 1961), pp. 455-465.

⁴C. V. Hartung, "The Persistence of Tradition in Grammar," Quarterly Journal of Speech, XLVIII: 2 (April, 1962), pp. 174-186.

language study and teaching. The great majority of school grammar books and of studies of language development and language ability are still based on this traditional theory.

Structural Grammar

A structural grammar of a language is a systematically organized series of descriptive analytical statements about the language. Although structural theory is not a new grammatical theory, since one of the best known structural grammars, Panini's Sanskrit grammar, was written in the third century B.C., nevertheless it has been but fairly recently applied to the English language. This recency may be judged from the fact that the first structural grammar of English, Fries' The Structure of English,⁵ was published as late as 1952 and three articles by Hall⁶ and Moulton⁷ cover almost the entire history of structuralism in English.

Structural grammars of English which are both descriptive and analytical are becoming more and more common; they are also being written for various public and purposes. The grammars of Roberts,⁸ Hill,⁹

⁵C. C. Fries, The Structure of English (New York: Harcourt, Brace and Co., 1952).

⁶R. A. Hall, Jr., "American Linguistics, 1925-50," Archivum Linguisticum, III (1951), pp. 101-125 and IV (1952), pp. 1-16.

⁷W. G. Moulton, "Linguistics and Language Teaching in the United States, 1940-1960," Trends in European and American Linguistics, 1930-1960, Christine Mohrmann, editor (Utrecht: Spectrum Publishers, 1961), pp. 82-109.

⁸Paul Roberts, Patterns of English (New York: Harcourt, Brace and World, Inc., 1956).

⁹A. A. Hill, Introduction to Linguistic Structures: From Sound to Sentence in English (New York: Harcourt, Brace and Co., 1958).

Francis¹⁰ and Sledd¹¹ are perhaps the best known of these grammars and the most widely used in schools and universities.

Transformational Grammar

The newest of the grammatical theories is that of transformational grammar. According to Chomsky, this grammar:

is essentially a theory of the sentences of a language; it specifies this set (or generates it, to use a technical term which has become familiar in this connection) and assigns to each generated sentence a structural description.¹²

The grammar is essentially a synthetic deductive grammar and the underlying theory owes much to what has been learned about the structures of logical, mathematical and axiomatic systems in recent years.¹³ Chomsky has said of the grammar of any language (L) that:

It is reasonable to regard the grammar of a language L ideally as a mechanism that provides an enumeration of the sentences of L in something like the way in which a deductive theory gives an enumeration of a set of theorems.... Furthermore, the theory of language can be regarded as the study of the formal properties of such grammars, and, with a precise enough formulation, this general theory can provide a uniform method for determining, from the process of generation of a given sentence, a structural description which can give a good deal of insight into how this sentence is used and understood.¹⁴

Recently, Katz has further elaborated this point:

¹⁰W. N. Francis, The Structure of American English (New York: Ronald Press Co., 1958).

¹¹J. H. Sledd, A Short Introduction to English Grammar (Chicago: Scott, Foresman and Co., 1959).

¹²Noam Chomsky, "On the Notion 'Rule of Grammar'," Structure of Language and Its Mathematical Aspects, Roman Jakobson, editor (Proceedings of Symposia in Applied Mathematics, Vol. XII. Providence: American Mathematical Society, 1961), p.7.

¹³Emmon Bach, An Introduction to Transformational Grammars (New York: Holt, Rinehart and Winston, Inc., 1964), pp.9-13.

¹⁴Noam Chomsky, "Review of B. F. Skinner: Verbal Behavior," Language, XXXV(1959), pp.55-56.

The step of hypothesizing such a mechanism in the process of theory construction in linguistics is no different from hypothetical postulation in theory construction in any other branch of science when some component of the system about which we wish to gain understanding is inaccessible to observation. The linguist can no more look into the head of a fluent speaker than a physicist can directly observe photons or a biologist directly inspect the evolutionary events that produced the human species. The linguist, like the physicist and biologist, can only achieve scientific understanding by constructing a model of the system which contains a hypothesis about the structure of the components of the system that are not observable. If the logical consequences of the model match the observable behavior of the system and would not do so without the hypothesis, the scientist may say that this hypothesis accounts for the behavior of the system in terms of the behavior of the unobservable but causally efficient component. If the model is the simplest one which enables the scientist to derive all the known facts and predict previously unknown ones as effects of the hypothesized component, he can assert that his model ...correctly represents the structure of the mechanism underlying the speaker's ability to communicate with other speakers.¹⁵

A transformational grammar of a language is a very precise theory about how sentences are formed and understood in the language. As Chomsky has written:

A grammar of a language is, in effect, an hypothesis about the principles of sentence formation in this language.... We judge the truth or falsity of this hypothesis by considering how well the grammar succeeds in organizing the data, how satisfying an explanation it provides for a wealth of empirical observations, how far-reaching are its generalizations, how successfully it accommodates new data.¹⁶

By its very nature, the theory, and, therefore, all statements within the theory must be "formal, explicit, and as complete and simple as possible."¹⁷

¹⁵J. J. Katz, "Mentalism in Linguistics," Language, XL (1964), p. 128.

¹⁶Noam Chomsky, "Some Methodological Remarks on Generative Grammar," Word, XVII (1961), p.219.

¹⁷Bach, op. cit., p.19.

Several attempts have been made to write transformational grammars for English; however, since these attempts vary in scope and in purpose, the resulting grammars can be considered no more than non-definitive fragments of the best transformational grammar that might be written for English. Stockwell, a leading transformational grammarian, has recently commented on this particular characteristic of the transformational grammars published so far:

Nearly all the published discussion has been exemplification, chosen to show that some English-sentence types clearly lie beyond the inherent limitations of, for example, phrase structure (or immediate constituent) grammar, or to show... that certain fundamental relationships within English sentences can be accounted for by a grammar that contains transformational rules as one of its components.¹⁸

The best known longer attempts are those of Chomsky,¹⁹ Lees²⁰ and Roberts²¹. The Transformational Grammar Test used in this investigation is based on parts of these three attempts.

II. GRAMMAR AND COMPOSITION

Using Traditional Grammar

The relationship, if any, between students' knowledge of grammar, particularly traditional grammar, and their ability in composition has often been investigated. As Meckel has said in his review of the research literature on the subject:

That an understanding of grammar is related to the development of skill in speech and writing has been one of the most consistently held beliefs in the history of education,

¹⁸R. P. Stockwell, "Grammar? Today?" College Composition and Communication, XV (February, 1964), p.58.

¹⁹Noam Chomsky, Syntactic Structures, ('s-Gravenhage: Mouton and Co., 1957).

²⁰R. B. Lees, "The Grammar of English Nominalizations," Part II, International Journal of American Linguistics, XXVI:3 (July, 1960).

²¹Paul Roberts, English Sentences (New York: Harcourt, Brace and World, Inc., 1962).

originating in the philosophical and educational theories of the Greeks. In current practice, also, most teachers appear to assume that teaching grammar and usage is an important phase of teaching composition, for surveys of classroom methods have confirmed the fact that grammatical analysis and terminology receive a great deal of attention in English classrooms.

Reviews of educational research, however, have continually emphasized that instruction in grammar has little effect upon the written language skills of pupils.²²

Several of the research studies are worthy of mention since among them they reveal the various aspects of the problem which have been investigated. Sixty years ago, Hoyt gave a battery of tests to grade IX students in an attempt to discover relationships between abilities in various subjects. He concluded that:

insofar as the results are trustworthy, there is about the same relationship existing between grammar and composition and grammar and literary interpretation, as exists between any two totally different subjects, as grammar and geography.²³

Following a similar study in the early 1920's, Hull and Limp reported that an algebra test proved to be almost as good for diagnosing aptitudes in English as an English battery itself.²⁴ The results of an investigation by Asker into the relationship of the grammatical knowledge and composition ability of university freshmen proved to be no different, since the correlation was only 0.37²⁵. In still another study, Segel and Barr correlated the marks on a formal grammar test, an

²²H. C. Meckel, "Research on Teaching Composition and Literature," Handbook of Research on Teaching, N. L. Gage, editor (Chicago: Rand McNally and Co., 1963), p.974.

²³F. S. Hoyt, "The Place of Grammar in the Elementary Curriculum," Teachers College Record, VII (November, 1906), p.19.

²⁴C. L. Hull and C. E. Limp, "The Differentiation of the Aptitudes of an Individual by Means of Test Batteries," The Journal of Educational Psychology, XVI (February, 1925), pp. 73-88.

²⁵William Asker, "Does Knowledge of Grammar Function?" School and Society, XVII (January, 1923), pp. 107-111.

applied grammar test and academic subjects for high school students. When intelligence was held constant, the correlation between formal grammar scores and applied grammar scores, 0.48, was found to be almost identical with all the other correlations. They said of their findings that:

The conclusion which may fairly be drawn from the study seems to be that formal grammar has no immediate transfer value so far as applied English grammar is concerned. The correlation of 0.48 seemingly is caused by factors common to study of all high-school subjects and not by specific transfer.²⁶

More recently, Robinson conducted a study in England of 145 secondary pupils chosen from a number of schools in order to investigate the relationship between their knowledge of grammar (in this case knowledge of parts of speech and ability to analyze sentences) and their composition ability as evidenced in performance on three compositions per pupil rather than one. She reported correlations ranging from 0.31 to 0.57 between scores on the grammar tests and composition scores and concluded that there were also no significant differences in the composition scores of students from schools where much grammar was taught in an attempt to develop students' ability in language expression in comparison with the scores of students from schools where little grammar was taught at all.²⁷

Two important studies suggest that there are much better ways of improving composition ability than teaching traditional grammar for this purpose. Ash compared the pre-experimental and post-experimental compositions of groups of students in each of three junior high schools.

²⁶D. Segel and N. R. Barr, "Relation of Achievement in Formal Grammar to Achievement in Applied Grammar," Journal of Educational Research, XIV (December, 1926), p.402.

²⁷Nora Robinson, "The Relation between Knowledge of English Grammar and Ability in English Composition," The British Journal of Educational Psychology, XXX (June, 1960), pp.184-186.

In each school the members of a control group were taught classificatory grammar whilst the members of an experimental group were taught to think about the content and style of their writing. The members of the experimental groups made significantly greater progress in writing than the members of the control groups.²⁸ In Frogner's well-known study, the relative effectiveness of a "thought" method and a "grammar" method in the teaching of composition were compared. The "thought" method stressed the expression of ideas and completely ignored grammatical principles, whereas the "grammar" method placed emphasis on grammatical concepts and principles with secondary emphasis on ideas and content. Frogner reported that although the students taught with the "grammar" method did significantly better than those taught with the "thought" method on a classificatory grammar test, they did no better on various tests of sentence structure. In fact, in all tests except one, the students taught by the "thought" method performed better than those taught by the "grammar" method. Frogner added that the "thought" method was particularly successful with students whose I. Q.'s were below 105.²⁹

Macauley and Meade have offered further evidence of the futility of teaching traditional grammar to young students or low ability students for any purpose. Macauley's investigation in Scotland of the knowledge of traditional grammar held by secondary pupils led him to the conclusion that such grammar could not profitably be taught to students below the age of fourteen, for only after that age could

²⁸I. O. Ash, "An Experimental Evaluation of the Stylistic Approach in Teaching Written Composition in the Junior High School," The Journal of Experimental Education, IV (September, 1935), pp. 54-62.

²⁹Ellen Frogner, "Grammar and Thought Approaches in Improving Sentence Structure," The School Review, XLVII (November, 1939), pp. 663-675.

satisfactory progress be guaranteed.³⁰ Meade gave a composite test of traditional grammatical knowledge to 104 high school seniors along with the California Test of Mental Maturity, Advanced Form. Only the students above the third intelligence quartile performed in what Meade considered to be a satisfactory way on the composite grammar test.³¹

In 1960 Ingrid Strom published a review of 77 pieces of literature concerned with the relationship of grammar and usage to writing. She concluded:

The research findings show clearly and overwhelmingly that direct methods of instruction, focusing on writing activities and the structuring of ideas, are more efficient in teaching sentence structure, usage, punctuation, and other related factors than are such methods as nomenclature drill, diagraming, and rote memorization of grammatical rules.

Research reveals that a knowledge of classificatory grammar has little measurable effect on the ability to express ideas accurately or precisely in writing or speaking.³²

However, as Groff later pointed out, traditional grammar is still taught in spite of what research says because grammatical exercises are included in textbooks, because standardized tests tend to make use of traditional grammatical terminology, because teachers face pressures from parents and communities, and because teachers often feel that external English examinations require that students know a great deal of traditional grammatical terminology.³³ He could have added that

³⁰W. J. Macauley, "The Difficulty of Grammar," The British Journal of Educational Psychology, XVII (November, 1947), pp. 87-92.

³¹R. A. Meade, "Who Can Learn Grammar?" The English Journal, L (February, 1961), p.92.

³²I. M. Strom, "Research in Grammar and Usage and Its Implications for Teaching Writing," Bulletin of the School of Education, Indiana University, XXXVI:5 (September, 1960), pp. 13-14.

³³P. J. Groff, "Is Knowledge of Parts of Speech Necessary?" The English Journal, L (September, 1961), pp. 413-415.

teachers still seem to assume that teaching children about their language will improve their ability with the language.

Using Structural Grammar

With recent advances in linguistic knowledge leading to some teaching of structural grammar in classrooms instead of traditional grammar, a renewed interest has been taken in the problem of a possible connection between grammatical knowledge and writing ability. However, very few controlled investigations of possible connections have so far been reported.

The best controlled study of the effects of teaching structural grammar on writing ability appears to be one by Suggs. In her experiment Suggs used Roberts' Patterns of English with an experimental group in grade XI and a traditional grammar text with a control group in the same grade for a period of thirteen weeks. The pre-experimental and post-experimental performances of the students were compared by means of the STEP Writing Test and significant differences favoring the experimental group are reported. Suggs concluded that instruction according to the principles of linguistic science is superior to instruction in traditional grammar in their practical application to writing.³⁴

Following less well controlled studies, Senatore³⁵ and Mallis³⁶ both reported that high school students wrote better sentences

³⁴L. R. Suggs, "Structural Grammar Versus Traditional Grammar in Influencing Writing," The English Journal, L (March, 1961), pp.174-178.

³⁵J. J. Senatore, "SVO: A Key to Clearer Language Teaching," The English Journal, XLVI (October, 1957), pp. 419-424.

³⁶Jackie Mallis, "An Experiment with the New Grammar," The English Journal, XLVI (October, 1957), pp. 425-427.

when they were taught to write sentences according to the patterns described by structural grammarians. Burnet claimed similar success with college students who were taught structural grammar by diagraming. He maintained that this teaching resulted in a better command of the language, greater freedom in its use, and a greater reduction in errors than the teaching of traditional grammar.³⁷

In another study with grade VII students, Miller pointed out how stimulating for the students was the teaching of structural grammar, a claim frequently made for the grammar; however, she did not discuss the effect of such teaching on writing.³⁸ The intrinsic interest that structural grammar has for students seems to be an important factor in most of these studies.³⁹ It is possible that students who are interested in, and stimulated by, their work in the English classroom write better than those who find their work uninteresting. Consequently, one cannot really say whether it is the grammar itself or the interest which the grammar arouses in students which leads to any improvement in their writing ability.

Patterns of English was also used extensively in an experiment with classes of grade X, XI and XII students in Cheltenham, Pennsylvania. Schuster reported that students who did very poorly on a grammar pretest made particularly good progress, that structural grammar was well received, but that the effect on student writing was inconclusive.⁴⁰

³⁷MacCurdy Burnet, "Structural Syntax on the Blackboard," College English, XVI (October, 1954), pp. 38-43.

³⁸Frances Miller, "Structural Plotting for Understanding," The English Journal LI (December, 1962), pp. 632-639.

³⁹J. E. McMahon, "Ninth Grade," The English Journal, LII (May, 1963), pp. 354, 359.

⁴⁰E. H. Schuster, "How Good is the New Grammar?" The English Journal, L (September, 1961), pp. 392-397.

In a further discussion of the same experiment, Link and Schuster analyzed the results and mentioned that although no improvement in composition skills was observed, this could well be attributed to the fact that no attempt was made to relate the teaching of structural grammar to the improvement of composition.⁴¹

The fact that what can be measured of awareness of structural relationships cannot be used very successfully to predict success in composition was demonstrated in a study by O'Donnell, who set out:

- 1) to measure the degree of relationship existing between ability in written composition and awareness of structural relationships of words in English sentences;
- 2) to measure the degree of relationship existing between ability in written composition and ability to verbalize knowledge of rules and terminology of traditional English grammar; 3) to test the hypothesis that the correlation between ability in written composition and awareness of structural relationships in English is different from that between ability in written composition and ability to verbalize knowledge of rules and terminology of traditional English grammar.⁴²

O'Donnell administered three tests to 201 college freshmen of both sexes: the Iowa Grammar Information Test, Form A; the STEP Essay Test, Form 1A; and his own terminology-free "Test of Recognition of Structural Relationships in English." The Pearson r correlation coefficients were 0.42 for the essay test and the grammar test and 0.39 for the essay test and the structure test. Although both correlations were significant, neither was high nor were they significantly different from each other. Therefore, the structure test was neither a better nor worse predictor of essay writing ability than the grammar test, and it was also an equally poor predictor.

⁴¹F. R. Link and E. H. Schuster, "Linguistics in High School," Educational Leadership, XIX (February, 1962), pp. 294-299.

⁴²R. C. O'Donnell, "The Correlation of Awareness of Structural Relationships in English and Ability in Written Composition," The Journal of Educational Research, LVII:9 (May-June, 1964), p.464.

Using Transformational Grammar

No studies of the relationship of a knowledge of transformational grammar to composition ability exist although some investigations are underway. In one such study, under the auspices of Project English, transformational grammar is being taught to an experimental group of students at The Ohio State University Center for School Experimentation and the compositions written by these students are to be compared with those written by a control group of students for a variety of purposes. As yet the investigators, Bateman and Zidonis, have nothing to report.⁴³ A similar study is also underway at the Culver Military Academy in Indiana, where, through the use of control and experimental groups, an attempt is being made to measure the contributions of the teaching of transformational grammar to the students' development in syntactic competence in writing.⁴⁴ In another Project English study to be directed by Professor Kellogg Hunt at Florida State University, thousand word samples of writing taken from average students in grades IV, VIII and XII are to be described sentence by sentence in terms of transformational grammar. The investigation seeks to show the emergence of certain structures in writing and to examine the control of these structures as they emerge.⁴⁵

Conclusion

It is apparent that no very close relationship seems to have been demonstrated between knowledge of either traditional or structural

⁴³D. R. Bateman, Personal Communication, dated March 13, 1964.

⁴⁴English Department, Culver Academy, "Transformational Grammar in the Culver Military Academy English Curriculum" (Culver, Indiana: Culver Military Academy, 1963). (Mimeographed.)

⁴⁵K. W. Hunt, "What PROJECT ENGLISH Grant #1998 is About," in "Research News and Notes," Florida Journal of Educational Research, VI;I (January, 1964), pp. 122-124.

grammar and composition ability, no matter how such knowledge and ability are estimated, and that teaching grammar on the assumption that such teaching will lead to an improvement in composition ability is at best a dubious assumption unsupported, as yet, by the research evidence.

Gurrey has said of the purposes of teaching grammar that:

the study of grammar for schoolchildren should help them to express themselves more clearly, more exactly, more vividly, and it should train them to understand what they hear and read more accurately, more completely and more appreciatively.⁴⁶

The evidence from research, however, does not substantiate his hopes, hopes which are apparently, if one is to judge by the textbooks teachers use, still shared by many English teachers. In view of this evidence, Gurrey would himself teach grammar for its own sake as "part of the equipment of every educated person," even if such teaching resulted in very little or no improvement in writing.⁴⁷ Roberts, a structural grammarian, has expressed a similar viewpoint. Since:

It is not to be expected that study of the grammar, no matter how good a grammar it is or how carefully it is taught, will effect any enormous improvement in writing,⁴⁸

Roberts advises that the grammar of English be taught for its own sake and for its intrinsic value:

For grammar is the heart of the humanities, and like other humane studies its ultimate justification is that it informs the mind and teaches its own uses.⁴⁹

Similarly, in his presidential address to the National Council of Teachers of English in 1961, Allen praised the Portland, Oregon,

⁴⁶Percival Gurrey, Teaching English Grammar (Toronto: Longmans, Green and Co., 1961), p.4.

⁴⁷Ibid., p.115.

⁴⁸Paul Roberts, "Linguistics and the Teaching of Composition," The English Journal, LII (May, 1963), p.335.

⁴⁹Ibid.

curriculum in which:

the English language itself -- its nature, its structure, its etymological and semantic past, its lexicography, and its regional characteristics -- constitutes basic subject-matter for its own sake during the four years of the senior high school.⁵⁰

In like vein, the transformational grammarian Lees, having expressed doubts that the teaching of English grammar will lead to improvement in writing, reading or literary appreciation, concluded by saying that:

If English grammar is to be taught at all in the secondary schools, then there is little if any justification for teaching it in conjunction with rhetoric or literature; rather, such a study of language belongs in the area of science and general education along with psychology and anthropology.⁵¹

The teaching of grammar for its own sake, as an end in itself, may seem almost revolutionary in an age which has emphasized the teaching of functional grammar, that is the teaching of grammar as a means to the end of better speaking and writing. However, since the research evidence clearly lends little support to the effectiveness of teaching such a functional grammar, grammar has actually been taught all along for its own sake. Moreover, the actual grammar taught has been put a poor description of English. Certainly, the teaching of a good description, either structural or transformational, could scarcely be still less effective.

III. LANGUAGE DEVELOPMENT STUDIES

Using Traditional Grammar

Almost all studies of language development conducted within traditional grammar have been concerned mainly with such matters as

⁵⁰H. B. Allen, "With New Endeavor," The English Journal, LI (February, 1962), p.75.

⁵¹R. B. Lees, "The Promise of Transformational Grammar," The English Journal, LII (May, 1963), p.345.

changes in the distribution of parts of speech, in sentence length, in utterance length, and in clausal complexity. Between them, in their separate reviews of the literature, McCarthy⁵² and Carroll⁵³ have evaluated most of the relevant literature of such studies and pointed out most of the significant findings.

Some of the individual studies are worthy of mention since they illustrate both the major concerns of the investigators and some of the major weaknesses of the investigations. Templin, for example, reported that the distribution of parts of speech in the speech and writing of children is similar to the distribution of parts of speech in the speech and writing of adults:

After the age of 3 the parts of speech used in both the total number of words and the different words uttered show little change. This is...an indication that the language of children is functioning similarly to the language of adults.⁵⁴

However, sentence and utterance length have been shown by Nice⁵⁵, Godwin⁵⁶

⁵²Dorothea McCarthy, "Language Development in Children," A Manual of Child Psychology, Second Edition, Leonard Carmichael, editor (New York: John Wiley and Sons, Inc., 1954), pp. 492-630.

⁵³J. B. Carroll, "Language Development," Encyclopedia of Educational Research, Third Edition, C. W. Harris, editor (New York: The Macmillan Co., 1960), pp. 744-752.

⁵⁴M. C. Templin, Certain Language Skills in Children: Their Development and Interrelationships (Institute of Child Welfare Monograph Series, No. 26. Minneapolis: University of Minnesota Press, 1957), p.104.

⁵⁵M. N. Nice, "Length of Sentences as a Criterion of a Child's Progress in Speech," The Journal of Educational Psychology, XVI (September, 1925), pp. 370-379.

⁵⁶L. R. Godwin, "An Analysis of the Sentence Structure and Paragraph Writing of City of Calgary Students in Grades V, VIII, and XI" (Unpublished M.Ed. thesis, The University of Alberta, 1955).

McKie⁵⁷ and Bear⁵⁸ to increase throughout childhood and adolescence.

Nice even went so far as to say that:

The average sentence length may well prove to be the most important single criterion for judging a child's progress in the attainment of adult language.⁵⁹

In her thesis Godwin described an increase in written sentence length from eleven to seventeen words between grades V and XI, and McKie and Bear in their studies reported an increase in composition length between grades IV and V in the first case and grades I and VIII in the second.

Clausal complexity and the use of subordination have been closely examined because the use of the compound and complex sentences of traditional grammar has been assumed to indicate more linguistic ability or more advanced linguistic development than the use of simple sentences. LaBrant used the subordination index:

$$\text{Subordination Index} = \frac{\text{Dependent Predicates}}{\text{Total Predication}}$$

in her analysis of 1007 compositions written on the topic of summer vacations by students in grades IV to XII. She found that:

The subordination index is a function of both mental and chronological age, but is markedly influenced by chronological age when mental age is constant.⁶⁰

⁵⁷F. I. McKie, "An Analysis of Free-Writing by Grade Four, Five and Six Students" (Unpublished M.Ed. thesis, The University of Alberta, 1963).

⁵⁸M. V. Bear, "Children's Growth in the Use of Written Language," The Elementary English Review, XVI (December, 1939), pp. 312-319.

⁵⁹Nice, op. cit., p.378.

⁶⁰L. L. LaBrant, "A Study of Certain Language Developments of Children in Grades Four to Twelve Inclusive," Genetic Psychology Monographs, XIV:5 (1933), p.425.

The increase LaBrant noticed in the use of subordination was also noticed by Frogner⁶¹, Davis⁶², Bear and Templin in their studies. However, Watts and Gray have both warned about the questionable validity of statements such as the following made by Gunn:

Each type of elaboration cannot be given the same status as an index of language power; sentences with a phrase cannot be rated as significant as compound and complex constructions.⁶³

The assumption that the compound or complex sentence of traditional grammar is necessarily more "powerful" than the simple sentence is quite unjustified. Watts pointed out that, "Mere increase in the percentage of dependent clauses by children is not the best index of progress in writing."⁶⁴ He added that the use of prepositional and infinitive phrases in simple sentences is a sign of linguistic maturity and traced the development of the use of some of these. Likewise Gray, following an analysis of the sentences written by Alberta students in grades V, VIII and XI, emphasized the increased sophistication of the simple sentences written by the grade XI students and claimed that many "sophisticated" simple sentences in this grade

⁶¹Ellen Frogner, "Problems of Sentence Structure in Pupils' Themes," The English Journal, XXII (November, 1933), pp. 742-749.

⁶²E. A. Davis, Linguistic Skill in Twins, Singletons with Siblings, and Only Children from Age 5 to 10 Years (Institute of Child Welfare Monograph Series, No. 14. Minneapolis: University of Minnesota Press, 1937).

⁶³John Gunn, "A Study of Pre-School Language," The Australian Journal of Education, VII (March, 1963), p.44.

⁶⁴A. F. Watts, The Language and Mental Development of Children (London: G. G. Harrap and Co. Ltd., 1944), p.123.

replaced the relatively "simple" complex sentences of earlier grades.⁶⁵

Whilst studies of language development within the traditional theory have been numerous, they have exhibited many weaknesses. These weaknesses have undoubtedly arisen from the fact that the grammatical theory itself has certain inadequacies and that certain of the assumptions made by users of the theory, such as the assumption about complex sentences being necessarily more "powerful" than simple sentences, are unwarranted. Furthermore, studies of such fairly superficial matters as the distributions of parts of speech and the numbers of words in sentences seem to have little real connection with such basic problems and processes of language development as how children learn to differentiate significant sounds, to categorize words, and to produce grammatical sentences.

Using Structural Grammar

Studies of language development within the framework of structural grammar are by no means as numerous as those within the framework of traditional grammar. However, the studies which have been reported are extremely informative.

The linguists Jakobson and Halle quite early suggested that the phonemic system acquired by a child developed by the process of the gradual binary cutting of the sound system into significant oppositions, such as vowel versus consonant, in order to establish functional sound contrasts.⁶⁶ Such a theory of phonemic acquisition was in marked contrast to existing theories which had generally been based on counts

⁶⁵M. E. Gray, "An Analysis of Language Themes in Grade Five, Grade Eight, and Grade Eleven," The Alberta Journal of Educational Research, VII:4 (December, 1961), p.212.

⁶⁶Roman Jakobson and Morris Halle, Fundamentals of Language ('s-Gravenhage: Mouton and Co., 1956), pp. 37-51.

of certain phones. Many investigators, moreover, had not understood the nature of functional contrasts nor, in some cases, had they had much knowledge of basic phonetics or even the relationship of speech and writing. For example, Davis and Templin were both concerned with whether children "pronounced letters" either "correctly" or "incorrectly." Irwin, too, in his important work,⁶⁷ lacked a good phonemic basis, for though he made his analyses in terms of "phonemes," these are not the phonemes of the linguist.

In contrast with the work of Davis, Templin and Irwin, the work of Velten⁶⁸, Leopold⁶⁹ and Burling⁷⁰ is most informative and largely confirms Jakobson's theory. In his description of the development of his daughter's speech, Velten ably demonstrated the process of binary cutting into functional contrastive sounds. Both Leopold, who interpreted some of his earlier work on his bilingual child in Jakobson's terms, and Burling, who examined the concurrent development of the English and Garo phonemic systems of his bilingual child, found confirmation for Jakobson's theory. Most recently, Ervin and Miller, following a review of the literature on this topic, concluded that it did demonstrate solid support for the theory.⁷¹

⁶⁷O. C. Irwin, "Development of Speech during Infancy: Curve of Phonemic Frequencies," Journal of Experimental Psychology, XXXVII (April, 1947), pp. 187-193.

⁶⁸H. V. Velten, "The Growth of Phonemic and Lexical Patterns in Infant Language," Language, XIX (1943), pp. 281-292.

⁶⁹W. F. Leopold, "Patterning in Children's Language Learning," Language Learning, V(1953), pp. 1-14.

⁷⁰Robbins Burling, "Language Development of a Garo and English Speaking Child," Word, XV (1959), pp. 45-69.

⁷¹S. M. Ervin and W. R. Miller, "Language Development," Child Psychology, H. W. Stevenson, editor (Sixty-second Yearbook, National Society for the Study of Education, Part I. Chicago: University of Chicago Press, 1963), pp. 112-114.

Attempts to apply the principles of structural grammar to the study of morphological and syntactical development in children have also been made. Kahane, Kahane and Saporta have even attempted to apply Jakobson's theory of gradual binary differentiation to morphology and syntax in a reinterpretation of older studies with results which suggest this as a possible fruitful area of investigation.⁷² Brown⁷³ and Berko⁷⁴ concentrated on morphological development and demonstrated the importance of the mastery of structure words and inflections in the acquisition of speech. They showed conclusively, mainly by means of the use of nonsense words, that children respond to nouns for example, not because they are "names", but because the noun class words share certain determining structure words, inflectional affixes, and positions in patterns.

A recent analysis by Weir⁷⁵ of the pre-sleep monologues of her two-and-a-half year old son revealed some confirmation of both Jakobson's theory of phonemic acquisition and of Berko's findings on morphological development. Weir's study is particularly interesting since it shows how a very young child, in the isolation of his darkened crib in the evening, played quite deliberately with the phonological and grammatical patterns of the language he was learning during the daytime. In other words, even a very young child is conscious of the phonology and grammar of his language and can find pleasure and

⁷²Henry Kahane, Renée Kahane and Sol Saporta, "Development of Verbal Categories in Child Language," Part II, International Journal of American Linguistics, XXIV:4 (October, 1958).

⁷³R. W. Brown, "Linguistic Determinism and the Part of Speech," Journal of Abnormal and Social Psychology, LV (1957), pp. 1-5.

⁷⁴Jean Berko, "The Child's Learning of English Morphology," Word, XIV (1958), pp. 150-177.

⁷⁵R. H. Weir, Language in the Crib (The Hague: Mouton and Co., 1962).

satisfaction in playing with its structure.

Two further important and related studies using the principles of structural grammar are those of Strickland⁷⁶ and Loban⁷⁷. These studies, descriptive and analytic in scope, provide valuable insights into the grammatical complexity of the language of school children and offer some indication of the typical language development of children. Both studies demonstrate at the same time the strengths and the weaknesses of structural grammar in language development studies. The strengths lie in the rigorous analytical nature of the resulting descriptions; the weaknesses lie in the lack of organic unity and the lack of a sense of organic development in the language described. Moreover, like most other developmental studies based on structural grammar, these studies are both concerned with the language development of pre-school or elementary school children, though Loban's study is intended eventually to include students in the senior high school grades.

Using Transformational Grammar

Very few language development studies have been based on transformational grammar; however, certain suggestions have been made about how the principles of transformational grammar might be applied and several studies have explored certain very limited areas.

Lees early mentioned one possible area for investigation. Reviewing the particular transformational model proposed by Chomsky in Syntactic Structures, Lees said that this model shows that:

⁷⁶R. G. Strickland, "The Language of Elementary School Children: Its Relationship to the Language of Reading Textbooks and the Quality of Reading of Selected Children," Bulletin of the School of Education, Indiana University, XXXVIII:4 (July, 1962).

⁷⁷W. D. Loban, The Language of Elementary School Children (National Council of Teachers of English, Research Report, No. 1, Champaign, Illinois: National Council of Teachers of English, 1963).

Interrogative word questions must be derived from yes-no questions in English, but not vice versa. If now we should find that English-speaking children generally learn to use the former only after having mastered the latter type, this grammatical fact will provide an explication for the ordering of the learning process. But if children tend to learn in the opposite or in random direction, the ordering among the structures in the grammar will be rather difficult to explain.⁷⁸

Such a method of inquiry into language acquisition is prompted by a concern which Lees has expressed elsewhere, a concern with the study of how children do acquire language rather than a concern merely with the description of the language of children at different stages:

Perhaps the most astounding aspect of human behavior upon which such a study might shed some light is the young child's ability to acquire in a short time, and with no special tuition, complete mastery of an immensely complex apparatus for constructing and understanding grammatical sentences. We shall at least be able to give some measure of the scope or depth of the remarkable achievement of specifying exactly what the task involves and presupposes.⁷⁹

Chomsky and Miller have also expressed a similar concern with the acquisition of language by children:

One way to highlight the theoretical questions involved here is to imagine that we had to construct a device capable of duplicating the child's learning. It would have to include a device that accepted a sample of grammatical utterances as its input (with some restrictions, perhaps, on their order of presentation) and that would produce a grammar of the language (including the lexicon) as its output. A description of this device would represent a hypothesis about the innate intellectual equipment that a child brings to bear in acquiring a language.⁸⁰

Lees' suggested investigation of the acquisition of questions has been

⁷⁸R. B. Lees, "Review of Noam Chomsky: Syntactic Structures," Language, XXXIII (1957), p. 405.

⁷⁹Lees, "Grammar," p. xvi.

⁸⁰Noam Chomsky and G. A. Miller, "Introduction to the Formal Analysis of Natural Languages," Handbook of Mathematical Psychology, Volume II, R. D. Luce, R. R. Bush and Eugene Galanter, editors (New York: John Wiley and Sons, Inc., 1963), p. 276.

criticized, however, by no less an authority than the psychologist Carroll:

There is... no behavioral reason why a child... could not learn an interrogative structure before he learns a declarative structure; therefore, one would be surprised to confirm Lees' expectation that the order in which a child learns constructions corresponds to the logical taxis of the transformations.⁸¹

A similar criticism of the idea that a transformational grammar is a literal account of how sentences are either learned or constructed by speakers of a language was also voiced by a linguist, Bolinger:

The distinctive trait of generative grammar is its aim to be an ACTIVE portrait of grammatical processes. It departs from traditional grammar, which consists chiefly in the MAPPING of constructions. How much actual invention, on this model, really occurs in speech we shall know only when we have the means to discover how much originality there is in utterance. At present we have no way of telling the extent to which a sentence like I went home is a result of invention, and the extent to which it is a result of repetition.... Is grammar something where speakers 'produce' (i. e. originate) constructions, or where they 'reach for' them, from a pre-established inventory, when the occasion presents itself? If the latter, then the MATCHING technique of traditional grammar is the better picture -- from this point of view, constructions are not produced one from another or from a stock of abstract components, but filed side by side, and their interrelationships are not derivative but mnemonic.⁸²

On the whole the particular line of inquiry suggested by Lees and criticized by Carroll and Bolinger has not been pursued. Rather, investigators have concentrated on writing transformational models to account for the language of children of various ages.

As part of his study of the development of children's language, Loban examined the "transformational skills" of two quite different

⁸¹J. B. Carroll, "An Operational Model for Language Behavior," Anthropological Linguistics, I:1 (January, 1959), p. 43.

⁸²D. L. Bolinger, "Syntactic Blends and Other Matters," Language, XXXVII (1961), p.381.

subjects, a high group boy, Dino, and a low group girl, Anngelina.

He concluded:

At the age of ten, Dino is handling grammatical transformation with a proficiency Anngelina has not yet reached even at the age of twelve. Examination of the transcripts for the low and high groups shows clearly that this difference prevails for all subjects in the two groups. The method, therefore, holds promise for future research.⁸³

Livant used a Chomsky-like model to study the generation of nominal compounds with five-year olds and saw a possible ordering of development in their use.⁸⁴ Two studies by Braine⁸⁵ are concerned with the generation of the first "sentences" of very young children; both studies show the possibilities of a generative theory in the investigation of even the first stages of language development. Most recently, Brown and Bellugi have used both structural and generative principles in a study of the developing syntax of a boy and a girl between the eighteenth and thirty-sixth months. They report on what they call the "very intricate simultaneous differentiation and integration that constitutes the evolution of the noun phrase," with which they were particularly concerned, and remark how difficult this process is both to describe and explain within current psychological theory.⁸⁶

⁸³Loban, op. cit., p.63.

⁸⁴W. P. Livant, "Productive Grammatical Operations: 1: The Noun-compounding of Five-Year Olds," Language Learning, XII (1962), pp. 15-26.

⁸⁵M. D. S. Braine, "The Ontogeny of English Phrase Structure: The First Phase," Language, XXXIX (1963), pp. 1-14; "On Learning the Grammatical Order of Words," Psychological Review, LXX (July, 1963), pp. 323-348.

⁸⁶Roger Brown and Ursula Bellugi, "Three Processes in the Child's Acquisition of Syntax," Harvard Educational Review, XXXIV (Spring, 1964), p.151.

The most comprehensive developmental study so far reported within the framework of transformational grammar is that by Menyuk of the language of 48 nursery and 48 grade I children.⁸⁷ Menyuk created various situations to encourage speech: the Blacky Picture Tests; an adult-child situation; and a child-peer group situation. All the language used by the children in the various situations was recorded and analyzed, and a model transformational grammar was then written to account for the data. The two groups of children were then compared for their use of the model and certain significant differences in the use of the model were revealed between nursery children and grade I children. For example there were significant differences at the 0.01 level in the use of Menyuk's "Nominalization", "If" and "So" transformations.

In a further study, Menyuk required nursery school and kindergarten children to repeat and correct incorrect sentences such as I have two tooth, I see a dog what's white and He liketed that game. She found that even for very young children sentence length did not seem to affect recall ability and that the main kind of deviation in repetition was towards simplifying the structure by using rules that came earlier in the grammar. The children were also quite able to produce grammatical transformations which they did not use in their own sentences and they were also quite capable of correcting deviant sentences. Menyuk concluded by saying:

The data obtained seem to indicate that the children in this population, at age 3, have incorporated most of the

⁸⁷Paula Menyuk, "A Descriptive Study of the Syntactic Structures in the Language of Children: Nursery School and First Grade" (Unpublished Ed.D. thesis, Boston University, 1961).

basic generative rules of the grammar that we have thus far been able to describe and are using these rules to understand and produce sentences.⁸⁸

The use of transformational theory in language development studies has but barely begun. Still needed are valid ways of using the theory and more complete transformational grammars of children's language at various stages and of adult language so that the gradual development of language ability may be better demonstrated and understood. In a recent article in the Harvard Educational Review, Postal has pointed out the need for an even better understanding of transformational theory than presently exists because:

the primary constraint on the study of language learning is the logically prior knowledge of the character of the linguistic system which must be learned. And the more specific and detailed this knowledge can be made, that is, the more closely one can describe the general theory of linguistic descriptions which amounts to a hypothesis about the innate genetic knowledge which the human child brings to language learning, the greater is the possibility of being able to formulate the techniques or strategies which the child uses to apply this inherent knowledge of possible linguistic structure to induce the details of a particular language from his linguistic experience.⁸⁹

In this statement Postal has succinctly set out the approach of those psychologists, educators and linguists who are presently using transformational theory in their investigations of language development and language ability.

IV. FACTORS RELATED TO LANGUAGE ABILITY

Language ability has been related by various investigators to each of three important factors: sex, socio-economic status and

⁸⁸Paula Menyuk, "A Preliminary Evaluation of Grammatical Capacity in Children," Journal of Verbal Learning and Verbal Behavior, II (1963), p.438.

⁸⁹P. M. Postal, "Underlying and Superficial Linguistic Structure," Harvard Educational Review, XXXIV (Spring, 1964), p.265.

intelligence. The problem is further complicated by the fact that attempts to separate the effects of the three factors have not been very successful and the results of various investigations are often quite conflicting.

Sex Differences

Following her comprehensive survey of the relevant literature on the subject, McCarthy concluded that there is considerable evidence in that literature to suggest that boys are slightly later than girls in all aspects of language development and have a disproportionate number of language disorders. The girls' superiority shows itself in sentence length, vocabulary, articulation, comprehensibility, correctness, freedom from slang, and fluency.⁹⁰ One of the best known studies on this subject, that of Stroud and Lindquist, traced sex differences over a school career and showed how girls performed better on the Iowa Every-Pupil Test in grades III to VIII; however in the high school grades boys had the lead in everything except algebra and reading comprehension.⁹¹

In studies conceived on structural and transformational principles, however, neither Berko⁹² nor Menyuk reported significant sex differences. Menyuk, for example, said:

Comparison of males and females... at the nursery school level and at the first-grade level was also made, and no significant differences were found.... This indicates that there is no difference between the sexes in the acquisition of syntactic structures.⁹³

⁹⁰McCarthy, op. cit., pp. 576-581.

⁹¹J. B. Stroud and E. F. Lindquist, "Sex Differences in Achievement in the Elementary and Secondary Schools," The Journal of Educational Psychology, XXXIII (December, 1942), pp. 657-667.

⁹²Berko, op. cit., p.171.

⁹³Menyuk, op. cit., p.59.

Studies conducted in Alberta, mostly with elementary and junior high school students, have produced conflicting evidence as to sex differences in various aspects of language. Reid found no significant differences between the sexes in intelligence; however, grade VII girls performed significantly better than grade VII boys on the California Language Test.⁹⁴ McKie reported significant differences favoring the girls between the free essay writing of boys and girls in grades IV and V, but not in grade VI.⁹⁵ Following analysis of a series of tests given in the Clover Bar School Division, Sly concluded that there was no evidence of consistent sex differences in the twelve grades in verbal ability or intelligence, although between grades IV and XII, except for grade IX, the girls performed significantly better than the boys on the STEP Essay and STEP Writing tests.⁹⁶

Socio-economic Differences

If the nature of sex differences in language development and performance is unclear, the effect of socio-economic status on ability and performance is no more clear. McCarthy pointed out that the socio-economic status of parents exerts an important effect on the language development of their children⁹⁷ and Templin reported that children from low socio-economic groups take up to a year longer than children from high groups to master certain articulatory features of English and that there are certain large significant differences at various age

⁹⁴T. J. Reid, "A Survey of the Language Achievement of Alberta School Children in Relation to Bilingualism, Sex, and Intelligence " (Unpublished M.Ed. thesis, the University of Alberta, 1954), p.53.

⁹⁵McKie, op. cit., p.95.

⁹⁶H. F. Sly, "An Analysis of Sex Differences in an Alberta School Population" (Unpublished Ed.D. thesis, The University of Alberta, 1960), p.121.

⁹⁷McCarthy, op. cit., pp. 586-587.

levels between the groups in such characteristics as articulation of sounds, grammatical complexity of verbalizations, and recognition vocabulary.⁹⁸ Gunn said of his findings in Australia that they do "suggest very strongly that differences in language skills are involved in any recognized classification on socio-economic status."⁹⁹ More recently, Strickland stated that there is apparently no significant relationship between the syntactical patterns a child uses and his parents' occupations, but there are some significant relationships between those patterns and his parents' educational level.¹⁰⁰

Intelligence Differences

The nature of the socio-economic factor in language development is beclouded by the relationship of socio-economic status to intelligence and measures of intelligence. In his 1948 Inglis Lecture, Davis pointed out this connection and the "middle class" bias of existing tests.¹⁰¹ Haggard has also pleaded for the construction of "culture fair" tests which would allow for a better assessment of intelligence¹⁰² and, stimulated by such concerns, Elley compared several existing intelligence tests in order to find out which one gave the best measure of the "g" factor with the least socio-economic bias.¹⁰³

⁹⁸Templin, op. cit., pp. 147-149.

⁹⁹Gunn, op. cit., p.47 .

¹⁰⁰Strickland, op. cit., p.61.

¹⁰¹Allison Davis, Social Class Influences on Learning (Cambridge: Harvard University Press, 1957), pp. 59-88.

¹⁰²E. A. Haggard, "Social Status and Intelligence: An Experimental Study of Certain Cultural Determinants of Measured Intelligence," Genetic Psychology Monographs, XLIX:2 (May, 1954), pp.141-186.

¹⁰³W. B. Elley, "A Comparative Analysis of the Socio-Economic Bias in Selected Intelligence Tests " (Unpublished Ph.D. thesis, The University of Alberta, 1961).

The precise relationship between socio-economic status and intelligence is important since both are said to be important factors in language ability. Intelligence was related to achievement in grammar by Meade who gave a composite grammar test to 104 high school seniors. He reported that there were significant differences in performance on the grammar test between students in the top and bottom quarters on the intelligence test which he also gave.¹⁰⁴ More positive still is the statement by Gunn resulting from his investigation that:

High intelligence went with superior performance in all tests of language power. This does not explain whether high I. Q. causes greater language skill or whether the latter gives a false impression of the former.¹⁰⁵

In Alberta, Reid and Conquest reported:

Substantial positive correlations are found to exist between intelligence and language achievement, as measured by the California Short-Form Test of Mental Maturity and the California Language Test, Intermediate, Form AA. The coefficient of correlation for the combined Alberta samples of grade VII children is 0.66.¹⁰⁶

A less positive relationship between language ability and intelligence was mentioned by O'Donnell, who reported low correlations between scores on a grammatical test constructed on principles of structural grammar and scores on standardized tests of intelligence (0.48), reading vocabulary (0.46) and reading level (0.44). The highest correlation mentioned by O'Donnell (0.75) was actually between the structural grammar test and a traditional grammar test, the Iowa Grammar Information Test.¹⁰⁷ In her study, Strickland reported little

¹⁰⁴Meade, op. cit., p.92.

¹⁰⁵Gunn, op. cit., p.53.

¹⁰⁶T. J. Reid and G. R. Conquest, "A Survey of the Language Achievement of Alberta School Children," The Alberta Journal of Educational Research, 1:2 (June, 1955), p.50.

¹⁰⁷R. C. O'Donnell, "A Study of the Correlation between Awareness of Structural Relationships in English and Ability in Reading Comprehension," The Journal of Experimental Education, XXXI (Spring, 1963), pp.313-316.

or no relationship between intelligence and the use of language patterns in grades I to VI¹⁰⁸ and Menyuk, likewise, pointed out that her analyses revealed no significant differences between those children below her mean intelligence level (131) and those above in the use of transformations; however, she noted that all the children in the study were well above average in intelligence.¹⁰⁹

Conclusion

Language development is not only obviously connected with chronological age. Sex differences, socio-economic status and intellectual endowment (and the manner in which the latter is estimated) all seem to be connected with language development and with each other. It is apparent that any study of language ability or language development must be conducted so that these factors are as carefully controlled as possible in order that the actual variables under investigation can be clearly separated out at all times.

V. CONCLUSION

Recent developments in linguistic knowledge and linguistic theory have produced a much greater understanding of the concept of grammar than previously existed. In particular, transformational theory has led to the development of a linguistic model which promises to provide more insights into how language is actually acquired and used than any available model. Consequently, it is the model chosen for use in this investigation.

The state of knowledge concerning the relationship of grammatical ability and composition ability has advanced only very little

¹⁰⁸Strickland, op. cit., pp.60-61.

¹⁰⁹Menyuk, "Descriptive Study," p.59.

in recent years. The teaching of structural grammar and its use in tests of awareness of structural relationships have not proved to be more closely related to composition ability than the teaching and use in tests of traditional grammar. The literature reveals that the assumption that there is such a close relationship has still not been demonstrated as valid. The present investigation is one of a very few which are attempting to use transformational theory to examine this assumption which is basic to so much English teaching and which seems so obvious.

Language development studies have recently tended to be focused at the very early years of life when children are acquiring the language. Such studies, conducted within both structural and transformational theories, have been shown to be most insightful. However, the literature reveals the need for some investigation of possible language development during adolescence, particularly as this is the period during which students are taught so much about their language.

Finally, language ability has been shown by many studies to be closely related to other factors. In any attempts to measure grammatical ability, to examine relationships among various abilities which have to do with language, and to look at possible patterns of language development, it would be necessary to control as far as possible such factors as sex, socio-economic status and intelligence differences. This requirement could possibly best be met by using carefully matched groups for which all these factors were strictly controlled.

DESIGN OF THE STUDY

1. SELECTION OF THE MATCHED GROUPS

The selection of the students for the investigation was made in December, 1963 from within the public school population of Edmonton, Alberta, a city with a population in excess of 300,000. The design of the investigation called for comparisons among groups of students in the senior high school, the groups to be arranged by grade level, X, XI and XII, and by ability level, high, mid and low. Since the comparisons were to be of groups rather than of individuals, matched groups were required, the matching to be done on the basis of two major variables, grade and ability level, with sex differences and achievement differences controlled as much as possible. The smallest groups were to number ten for high and low ability levels in each grade; the largest groups were to number twenty for the mid ability levels in each grade. These numbers were chosen to avoid the specialized statistical treatments required for small groups, to avoid unnecessary complications in matching large groups, and to provide for representative distribution for grade comparisons. The experimental model called for groups matched as in Table I. In each group (10 or 20 students) at each level, half the students were to be boys and half girls. The students within each group were also to be as close to each other as possible in intelligence and academic achievement.

For each student the measure of ability used for matching purposes was the SCAT percentile score¹ awarded him on province-wide

¹Cooperative Test Division, Cooperative School and College Ability Tests (Princeton, New Jersey: Educational Testing Service, 1956).

examinations given yearly to over 20,000 grade IX students.² The achievement score used was the total combined stanine score for six academic subjects (language, literature, reading, social studies, mathematics and science) in the same examinations.

TABLE I
EXPERIMENTAL MODEL FOR GROUPS

| Grade Level | High Ability Level | Mid Ability Level | Low Ability Level |
|-----------------------------|--------------------|-------------------|-------------------|
| XII (in 12th yr. in school) | 10 | 20 | 10 |
| XI (in 11th yr. in school) | 10 | 20 | 10 |
| X (in 10th yr. in school) | 10 | 20 | 10 |

An additional intelligence score was also recorded for each student, this one being the score from the Laycock Mental Ability Test³ administered in the intermediate grades as part of the city public school system's testing program. This score was required for the later matching of students in their eighth year in school with those in their tenth year in school.

For convenience in test administration, the senior high school students were drawn from one high school with an enrolment of 1924 students in grades X to XII. A preliminary examination of the senior high school's records revealed that the mean intelligence

²1961: 20,883; 1962: 23,797; 1963: 24,217. These figures are from the Annual Reports, Department of Education, Province of Alberta (Edmonton: Queen's Printer, 1962-1964).

³S. R. Laycock, Laycock Mental Ability Test (Saskatoon: University of Saskatchewan, 1933).

percentile rank on the grade IX examinations for the students in the school between 1959 and 1963 fell close to the sixty-fifth percentile. In addition, the examination revealed that for those students who were in their twelfth year in school and were in grade XII, the low ability level students would have to be drawn from between the thirtieth and fortieth percentile ranks since there were very few students below the thirtieth rank who were still in school or who had not repeated a year at some time. Consequently, at each grade level the high ability students were drawn from the ninety-second to ninety-eighth percentile ranks, the mid ability students from the sixty-second to sixty-eighth percentile ranks, and the low ability students from the thirty-second to thirty-eighth percentile ranks.

At each level, the names, percentile ranks, total stanine scores, and Laycock scores were recorded for all students in the high school who fell between each pair of the aforementioned percentile ranks. Two additional restrictions were imposed in the selection:

1. all students selected had to be British, American or Canadian born monolinguals, i.e. native speakers of English;
2. all of the required information had to be available together with a record of grade VII achievement, the latter to be used in the later selection of the groups in grade VIII.

Table II shows the means for all the high, mid and low ability level students with no differentiation made by grade level. Students whose scores most closely resembled those in Table II were then chosen for the matched groups; these students came from 41 different home rooms in the senior high school.

Table III contains the data for the final groups, and Appendix F the details for each student along with all other relevant information. As an additional precaution, the school's cumulative

record for each selected student was thoroughly re-checked to ensure that all the data were accurate. Table IV shows that the means for the final experimental groups were in all cases very close to those required by the model.

TABLE II

MODEL GROUP: MEANS BY ABILITY LEVEL FOR
THE THREE SELECTION CRITERIA

| Ability Level | Criteria | | |
|------------------|----------------------------|------------------|------------------|
| | Intelligence Percentile | Stanine Total | Laycock Score |
| High | 95.3 | 48.3 | 127.3 |
| Mid | 64.5 | 33.6 | 111.6 |
| Low | 34.6 | 27.5 | 102.7 |

The 120 senior high school students selected for the matched groups had received their junior high school education in fourteen different junior high schools. Table V shows the numbers of students who had attended each of the originating junior high schools. The grade VIII ability level groups were selected from Junior High School A. These groups were matched student by student with the equivalent grade X groups using the following controls:

1. intelligence score on the Laycock Mental Ability Test;
2. grade VII achievement score, this being the letter-grade average of scores in language, literature, reading, social studies, mathematics and science; and
3. sex.

From the 220 available grade VIII students, it was possible to choose forty who matched the grade X students very closely. The closeness of the final matching may be judged by referring to Appendix G.

TABLE III
EXPERIMENTAL GROUP: MEANS AND RANGES FOR
THE THREE SELECTION CRITERIA

| Group | n | Intelligence Percentile | | Stanine Total | | Laycock Score | |
|----------|----|-------------------------|-------|---------------|-------|---------------|---------|
| | | Mean | Range | Mean | Range | Mean | Range |
| High X | 10 | 95.4 | 93-97 | 48.8 | 46-52 | 127.4 | 120-135 |
| High XI | 10 | 95.2 | 94-97 | 48.0 | 43-53 | 125.3 | 114-131 |
| High XII | 10 | 95.3 | 94-97 | 48.0 | 46-51 | 126.5 | 116-131 |
| All High | 30 | 95.3 | 94-97 | 48.3 | 43-53 | 127.1 | 114-135 |
| Mid X | 20 | 64.6 | 62-68 | 33.8 | 31-39 | 111.2 | 96-126 |
| Mid XI | 20 | 64.8 | 62-68 | 32.7 | 29-38 | 114.1 | 95-133 |
| Mid XII | 20 | 64.3 | 62-67 | 34.4 | 27-40 | 112.6 | 101-123 |
| All Mid | 60 | 64.6 | 62-68 | 33.6 | 27-40 | 112.6 | 95-133 |
| Low X | 10 | 35.1 | 32-38 | 26.7 | 24-35 | 104.1 | 100-112 |
| Low XI | 10 | 34.4 | 33-37 | 26.9 | 22-31 | 102.1 | 97-108 |
| Low XII | 10 | 34.6 | 32-38 | 29.6 | 25-33 | 101.3 | 92-112 |
| All Low | 30 | 34.7 | 32-38 | 27.7 | 22-35 | 102.5 | 92-112 |

TABLE IV

COMPARISON OF THE MEANS FOR THE MODEL
AND EXPERIMENTAL GROUPS

| | Means | | | | | |
|------|----------------------------|--------|------------------|--------|------------------|--------|
| | Intelligence Percentile | | Stanine Total | | Laycock Score | |
| | Model | Exptl. | Model | Exptl. | Model | Exptl. |
| High | 95.3 | 95.3 | 48.3 | 48.3 | 127.3 | 127.1 |
| Mid | 64.5 | 64.6 | 33.6 | 33.6 | 111.6 | 112.6 |
| Low | 34.6 | 34.7 | 27.5 | 27.7 | 102.7 | 102.5 |

TABLE V

JUNIOR HIGH SCHOOL ORIGIN OF THE 120 SENIOR
HIGH SCHOOL STUDENTS WHO PARTICIPATED
IN THIS STUDY

| Junior High School | Number of Students |
|-----------------------|-----------------------|
| A | 32 |
| B | 25 |
| C | 17 |
| D | 13 |
| E | 8 |
| F | 6 |
| G | 5 |
| H | 5 |
| I | 3 |
| J | 2 |
| K | 1 |
| L | 1 |
| M | 1 |
| N | 1 |

II. TESTS

The investigation required the use of four tests:

1. A Transformational Grammar Test which would incorporate the latest linguistic theory, sample various parts of the existing sketches of the transformational grammar of English, employ a consistent analogical principle in item construction, and, if possible, be terminology-free.
2. A Traditional Grammar Test which would incorporate traditional grammatical theory, sample the grammar of the word and sentence in traditional terms, and require familiarity with the terminology of traditional grammar.
3. An Analogies Test which would serve to form some basis for judging the effect of the exclusive use of analogies in the Transformational Grammar Test.
4. An Essay Test which would simply, but reliably, gauge composition ability.

Transformational Grammar Test⁴

Description. This test, constructed by the investigator, consists of 44 items drawn from the following transformational grammars:

1. Noam Chomsky, Syntactic Structures ('s-Gravenhage: Mouton and Co., 1957).
2. R. B. Lees, "The Grammar of English Nominalizations," Part II, International Journal of American Linguistics, XXVI: 3 (July, 1960).
3. Paul Roberts, English Sentences (New York: Harcourt, Brace and World, Inc. 1962).

The test is organized into eight subtests, the first five of which require the selection of correct responses in a multiple-choice situation and the final three the production of acceptable sentence

⁴Appendix A

answers. All items are constructed on an analogical principle and the test avoids all grammatical terminology except the one word sentence, a basic term in transformational grammar.

In Subtest A, items 1 to 6 are nominal compounds taken from Lees:

1. a) and c) are from p. 127, type (I)A1, with b) and d) from p. 152, type (V)A1.
2. c) and d) are from p. 152, type (V)A1, with a) and b) from p. 127, type (I)A1.
3. a), b) and c) are from p. 129, type (I)B1, with d) from p. 134, type (II)B.
4. a) and d) are from p. 134, type (II)B, with b) and c) from p. 129, type (I)B1.
5. b) is from p. 157, type (VI)A1a, with a), c) and d) from p. 158, type (VI)A2a.
6. a) and c) are from p. 158, type (VI)A2a, with b) and d) from p. 157, type (VI)A1a.

Subtest A is scored as follows:

$$\frac{\text{correct responses} - \text{incorrect responses}}{2}$$

In Subtest B, items 7 to 10 are examples of potentially ambiguous structures:

7. b) and d) require the underlining of:

NP - V_{intrans} - adv

8. b) and d) require the underlining of:

NP - V_{cop} - adj

9. a), c) and d) require the underlining of:

NP - be - Nom³ - Nom¹

the result of a generalized transformation:

$$\left. \begin{array}{l} \text{NP} = \text{be} = \text{Nom}^1 \\ \text{Nom}^2 = \text{V}_{\text{trans}} = \text{Nom}^3 \end{array} \right\} \longrightarrow \text{NP} = \text{be} \text{Nom}^3 = \text{Nom}^1$$

where $\text{Nom}^1 = \text{Nom}^2$

10. b) and c) require the underlining of:

$$\text{NP} = \text{be} \text{adj} = \text{Nom}^1$$

the result of a generalized transformation:

$$\left. \begin{array}{l} \text{NP} = \text{be} = \text{Nom}^1 \\ \text{Nom}^2 = \text{be} = \text{adj} \end{array} \right\} \longrightarrow \text{NP} = \text{be-adj} = \text{Nom}^1$$

where $\text{Nom}^1 = \text{Nom}^2$

Subtest B is scored in the same way as Subtest A.

In Subtest C, items 11 to 17 are simple transformations from kernel sentences based on Chomsky. They require the use of the passive, negative and question transformations and are ordered as in Chomsky (pp. 111-113):

11.d) is T_{Passive}

12.c) is T_{Not}

13.a) is T_{Question}

14.c) is T_{Passive} and T_{Not}

15.d) is T_{Passive} and T_{Question}

16.b) is T_{Not} and T_{Question}

17.d) is T_{Passive} , T_{Not} and T_{Question}

In Subtest C and the following subtests (D to H) all correct responses are scored and all incorrect responses ignored.

In Subtest D, items 18 to 22 are generalized transformations based on Lees and Roberts:

18.d) is based on Roberts' Postposed Location Modifier (p. 73):

$$\left. \begin{array}{l} X = \text{Nom}^1 = Y \\ \text{Nom}^2 = \text{be} = \text{Loc} \end{array} \right\} \longrightarrow X = \text{Nom}^1 = \text{Loc} = Y$$

where $\text{Nom}^1 = \text{Nom}^2$

19. a) is based on Roberts' Relative Clause (p. 76):

$$\left. \begin{array}{l} X - \text{Nom}^1 - Y \\ \text{Nom}^2 - V_{\text{trans}} - \text{Nom}^3 \end{array} \right\} \dashrightarrow X - \text{Nom}^1 - \text{Wh} - \text{Nom}^2 - V_{\text{trans}} - Y$$

where $\text{Nom}^1 = \text{Nom}^3$

20. d) is based on Lees' (GT1), Factive Nominal 1) That-Clause (p. 62):

$$\left. \begin{array}{l} T + N_a - F \\ \text{Nom} + \text{VP} \end{array} \right\} \dashrightarrow \text{that} + \text{Nom} + \text{VP} - F$$

21. b) is based on Lees' (GT8), Action Nominal (p. 68):

$$\left. \begin{array}{l} X - T - N_a - Y \\ \text{Nom} - \text{Tns} - V_t - \text{Nom}^1 - (\text{Adj-Ly}) - Z \end{array} \right\} \dashrightarrow$$

$$X - \text{Nom} + \text{Gen} - (\text{Adj} \left\{ \begin{array}{l} \text{Ing} \\ \text{Nml} \end{array} \right\} V_t + \text{of} + \text{Nom}^1 - Z - Y$$

22. d) is based on Lees' (GT17), Abstractive Nominal (p. 85):

$$\left. \begin{array}{l} X - T - N_a - Y \\ \text{Nom} - \text{Tns} + \text{be} - A_z - (\text{Prev}) - \text{to} - (\text{Aux}_2)\text{MV} + Z \end{array} \right\} \dashrightarrow$$

$$X - \text{Nom} + \text{Gen} - A_z - \text{Nml} - \text{in}(\text{Prev})\text{Ing}(\text{Aux}_2)\text{MV} + Z - Y$$

In Subtest E, items 23 to 27 require the collapsing of sentences formed by generalized transformations into their component kernels:

23. d) requires the reverse process of item 18.

24. b) requires the reverse process of item 19.

25. d) requires the reverse process of item 21.

26. c) requires the reduction of:

$$(\text{Ing})V - \text{Adv} - \text{Nom}^1 - \text{VP}$$

into:

$$\text{Nom}^1 - \text{VP}$$

$$\text{Nom}^2 - V - \text{Adv}$$

$$\text{where } \text{Nom}^1 = \text{Nom}^2$$

27. d) requires the reduction of:

$$(Ed)V^1 - by = NP = Nom^1 - V^2 - X$$

into:

$$Nom^2 = V^1 - X$$

$$NP = V^2 - Nom^1$$

In Subtest F, items 28 to 34 are production items equivalent to those in Subtest C:

28. $T_{Passive}$: The spy will be shot by the soldiers.

29. T_{Not} : John $\left\{\begin{smallmatrix} \text{can't} \\ \text{cannot} \end{smallmatrix}\right\}$ do it.

30. $T_{Question}$: Did he go to the movies?

31. $T_{Passive}$ and T_{Not} : The test $\left\{\begin{smallmatrix} \text{won't} \\ \text{will not} \end{smallmatrix}\right\}$ be written by the students.

32. $T_{Passive}$ and $T_{Question}$: Will the lion be chased by the hunter?

33. T_{Not} and $T_{Question}$: $\left\{\begin{smallmatrix} \text{Hasn't the boy} \\ \text{Has the boy not} \end{smallmatrix}\right\}$ read the book?

34. $T_{Passive}$, T_{Not} and $T_{Question}$: $\left\{\begin{smallmatrix} \text{Aren't letters} \\ \text{Are not letters} \\ \text{Are letters not} \end{smallmatrix}\right\}$ being written by the children?

In Subtest G, items 35 to 39 are production items equivalent to those in Subtest D:

35. The team from the large high school defeated all its opponents.

36. The package (which) you $\left\{\begin{smallmatrix} \text{'ve} \\ \text{have} \end{smallmatrix}\right\}$ been expecting arrived this morning.

37. That the baby was healthy pleased him no end.

38. John's careful painting of the garage was praiseworthy.

39. The driver's cleverness in avoiding the accident pleased the crowd.

In Subtest H, items 40 to 44 are production items requiring the use of generalized transformations:

40. requires the reverse process of item 26: Leaving his tent, the hunter found himself face to face with a large bear.

41. requires the reverse process of item 27: Badly beaten in the battle, the army retreated to the mountains.

42. requires the generalized transformation:

$$\left. \begin{array}{l} \text{Nom}^1 - \text{VP} \\ \text{Nom}^2 - \text{V} - \text{Y} \end{array} \right\} \longrightarrow \text{to} - \text{V} - \text{Y} - \text{Nom}^1 - \text{VP}$$

To speak Russian fluently, you really must live in Russia.

43. requires the generalized transformation:

$$\left. \begin{array}{l} \text{Nom}^1 - \text{VP} \\ \text{Nom}^2 - \text{be} - \text{Adj} - \text{X} \end{array} \right\} \longrightarrow \text{Adj} - \text{X} - \text{Nom}^1 - \text{VP}$$

where $\text{Nom}^1 = \text{Nom}^2$

Afraid even to whisper, the prisoners huddled together in a corner.

44. requires the generalized transformation:

$$\left. \begin{array}{l} \text{Nom}^1 - \text{VP} \\ \text{Nom}^2 - \text{V} - \text{X} \end{array} \right\} \longrightarrow \text{by} - (\text{Ing})\text{V} - \text{X} - \text{Nom}^1 - \text{VP}$$

where $\text{Nom}^1 = \text{Nom}^2$

By jumping to one side, the workman saved his life.

Validity and Reliability. The validity of the Transformational Grammar Test resides in the fact that each correct response in the test requires either the recognition or production of a transformation analogous to the one in the example for the item. The preceding section gives a precise description of each item together with its exact source in one of the transformational grammars. Every item in the Transformational Grammar Test, therefore, has proven content validity.⁵

⁵J. R. Gerberich, H. A. Greene and A. N. Jorgensen, Measurement and Evaluation in the Modern School (New York: David McKay Co., Inc., 1962), pp. 54-55.

The reliability of the final form of the Transformational Grammar Test was established by the test-retest reliability method. The test was administered on two occasions two weeks apart to a group of twenty grade X students in a city high school in November and December, 1963. The test was administered in two forty-minute sessions under identical conditions. The raw scores of the students are given in Appendix E. Table VI shows a Test-Retest Reliability for the Transformational Grammar Test as a whole of 0.90.

TABLE VI

TRANSFORMATIONAL GRAMMAR TEST RELIABILITY: RANGES, MEANS, STANDARD DEVIATIONS AND CORRELATION COEFFICIENT

| | Test | Retest |
|----------------------------|-----------|---------|
| Range | 20.5 - 42 | 22 - 43 |
| Mean | 31.7 | 32.9 |
| Standard Deviation | 7.16 | 6.25 |
| Correlation Coefficient | 0.90 | |

Because the subtests of the Transformational Grammar Test were very short, five to seven items each, and "reliability is a function of test length"⁶ and of the number of subjects used to establish reliability, the reliability coefficients for the subtests varied widely, as shown in Table VII. However, following Ferguson,⁷ it was possible to make some comparison of the reliabilities of the eight subtests. The results of this comparison are also shown in Table VII. The order of

⁶G. A. Ferguson, Statistical Analysis in Psychology and Education (New York: McGraw-Hill Book Co., Inc., 1959), p.283.

⁷Ibid.

reliability, from most to least reliable, for the subtests was, therefore, H, B, G, E, F, D, A and C.

TABLE VII

TRANSFORMATIONAL GRAMMAR TEST:
SUBTEST RELIABILITY

| Subtest | Reliability Coefficient | Order of reliability for a standard test of n items |
|---------|-------------------------|---|
| A | 0.43 | 7 |
| B | 0.88 | 2 |
| C | 0.43 | 8 |
| D | 0.56 | 6 |
| E | 0.76 | 4 |
| F | 0.71 | 5 |
| G | 0.81 | 3 |
| H | 0.91 | 1 |

Traditional Grammar Test

The test of traditional grammar used in the investigation was the Barrett-Ryan-Schrammel English Test, New Edition, Form DM.⁸ In their Manual of Directions, the authors claim that the test is:

designed to measure objectively student and class proficiency in the essential mechanics of English -- functional grammar and usage, parts of speech, parts of a sentence.... The areas included are fundamental to success in written expression.⁹

Writing in The Fifth Mental Measurements Yearbook, however, Thomas takes issue with the authors of the test:

In the first place, although Test 1 is called functional grammar, many teachers would not agree that it is based on

⁸E. R. Barrett, T. M. Ryan and H. E. Schrammel, Barrett-Ryan-Schrammel English Test, New Edition, Form DM (New York: Harcourt, Brace and World, Inc., 1954). Appendix B.

⁹Manual of Directions, p.1.

functional grammar but rather on the familiar formal grammar.... Similarly, the subtest on the sentence is actually a test of the grammar of the sentence. There is no effort to test the student's skill in the construction of sentences.¹⁰

There seems little doubt that Thomas's view of the test is the more accurate one and that the Barrett-Ryan-Schrammel English Test is an objective test of traditional formal grammar rather than of traditional functional grammar. With its plentiful use of terminology, its basis in traditional grammar, and its emphasis on knowledge of language rather than use of language, the Barrett-Ryan-Schrammel English Test appeared to be ideally suited for use as the Traditional Grammar Test required in the investigation.

Only the first and second subtests, "Functional Grammar" and "Sentence", were administered in the investigation because the third and fourth subtests, "Punctuation" and "Vocabulary," were irrelevant to its purposes. No time limit is given by the authors for the two subtests when administered by themselves nor are reliabilities given. In the investigation, the students were allowed forty minutes to complete the two subtests and this time proved to be quite adequate for everyone.

Analogies Test

The Analogies Test used in the investigation was the California Analogies and Reasoning Test, Form A,¹¹ the only analogies test available for use in the senior high school grades. The author says of the test:

¹⁰C. A. Thomas, "Review: Barrett-Ryan-Schrammel English Test, New Edition," The Fifth Mental Measurements Yearbook, O. K. Buros, editor (Highland Park, New Jersey: The Gryphon Press, 1959), p.331.

¹¹Claude Mitchell, California Analogies and Reasoning Test, Form A (Monterey, California: California Test Bureau, 1958). Appendix C.

It is a forty-minute test containing 101 items presented in the form of analogies. The items are of such a nature that reasoning power, knowledge of terms, recognition of relationships between subject matter in the fields, and analytical skill must be called upon to select the correct responses. Thus, while the basic material from which the test was prepared is similar to that of an achievement test, the ability needed to use the information required in this test¹² places it in the category of the scholastic aptitude test.

The test, therefore, requires both the giving of analogical responses and a knowledge of subject matter, some of which is very American in content. The exclusive use of analogies in the items, however, far outweighs any bias in content and made the test suitable for the purposes of the investigation.

The author gives the test's reliability as follows: grade X -- 0.88; grade XI -- 0.94; and Grade XII -- 0.91.¹³ He also claims that scores on the test correlate highly with school marks and grades, with scores on similar tests, and with college grade-point averages.¹⁴ As yet, there is no published evaluation of these claims or of the test itself.

Essay Test

The Essay Test used in the investigation was the Cooperative Sequential Tests of Educational Progress: Essay Test, Form 2A,¹⁵ i. e., the STEP Essay. This test requires that each student write for thirty-five minutes on an assigned topic. The essay he writes is

¹²Manual, p.2.

¹³Ibid., p.3.

¹⁴Ibid., pp. 4-7.

¹⁵Cooperative Test Division, Cooperative Sequential Tests of Educational Progress, Essay Test, Form 2A (Princeton, New Jersey: Educational Testing Service, 1957). Appendix D.

compared with four comparison essays and assigned a rating between one and seven. No finer discrimination is attempted. The STEP Essay Test has been favorably reviewed¹⁶ and is much used in investigations concerned wholly or partly with composition ability because of its many attractive features.

Reliability. It is extremely difficult to arrive at a reliable assessment of a student's essay writing ability. Anderson has listed four difficulties:

1. unrepresentative sampling;
2. fluctuating performance;
3. variability among markers; and
4. inconsistency of the individual marker.¹⁷

It is just such difficulties that the STEP Essay Test is designed to overcome. Anderson investigated how successfully the STEP Essay Test had overcome these difficulties. In his investigation, 55 grade VIII students each wrote eight essays, two on each of four days and the days a week apart. Three markers then marked the essays on three different occasions. Anderson concluded:

The marking schedule of the new STEP Essay Test has not reduced, at least in this experiment, into insignificance the extent of variability characteristic of well-known sources in the marking of essays -- composition fluctuation, the unrepresentativeness of essay-samples, and discrepancies among markers.¹⁸

¹⁶O. K. Buros (ed.), The Fifth Mental Measurements Yearbook (Highland Park, New Jersey: The Gryphon Press, 1959), pp.357-359.

¹⁷C. C. Anderson, "The New STEP Essay as a Measure of Composition Ability," Educational and Psychological Measurement, XX (Spring, 1960), pp. 95-96.

¹⁸Ibid., p.101.

The designers of the test quote a rank correlation consistency reliability of 0.68 for Form 2A with 376 students.

In this investigation the following marking procedure was adopted:

1. The 120 essays were placed in random order.
2. All identifying details were removed: names, ages and grades.
3. The essays were numbered from one to 120.
4. The essays were read by the markers in the order one to 120.
5. The markers, two long experienced high school English teachers, were paid to grade the essays and record the grades on specially prepared mark sheets. Before the grading, the procedures were thoroughly discussed, six essays not used in the investigation were assessed in the company of the investigator, and agreement was reached on all major points.
6. Each marker read and graded the essays separately from the other marker and worked independently of the other.
7. The two grades were combined to give the total essay score.
8. Two weeks after the first grading, the markers regraded twenty of the papers. The papers chosen were papers 6, 12, 18... 120. These were recoded by the investigator as A, B, C... T and read in that order by the markers.

Figure I shows the distribution of grades assigned by the two markers. The Pearson r product-moment correlation for the 120 essays was 0.60. Table VIII shows the grades assigned in the consistency reliability procedure. For Marker One the reliability was 0.77; for Marker Two it was 0.73. These reliabilities are both higher than those reported by the designers of the test, particularly in view of the very small sample used in this investigation. It is also apparent that there was greater consistency within the individual marker than agreement between the markers, because the correlation for the twenty essays on the first occasion of marking was 0.34 and on the second 0.50.

III. TEST ADMINISTRATION

All the tests were administered in forty-minute school periods on successive mornings during one week in February, 1964, as follows:

Tuesday: the Analogies Test,

Wednesday: the Essay Test,

Thursday: the Traditional Grammar Test,

Friday: the Transformational Grammar Test.

Through the excellent cooperation of the staff and students of the two schools, it was possible to test all the students chosen for the investigation at one time and no retesting of individual students was necessary.

| | | | | | | | | |
|--------------------------------|---|-----------------------|---|----|----|---|---|---|
| Grades for Marker Two | 7 | | | | 1 | | 2 | |
| | 6 | | | 1 | 1 | 1 | 2 | |
| | 5 | | 1 | 2 | 6 | 7 | 3 | 1 |
| | 4 | | 1 | 9 | 12 | 7 | 1 | 2 |
| | 3 | | 6 | 13 | 16 | 1 | | |
| | 2 | | 5 | 13 | 3 | | | |
| | 1 | | | 3 | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | Grades for Marker One | | | | | | |

FIGURE 1

STEP ESSAY TEST: BIVARIATE FREQUENCY DISTRIBUTION
OF THE GRADES OF TWO MARKERS

TABLE VIII
STEP ESSAY TEST RELIABILITY: GRADES
AND CORRELATIONS

| Essay | Marker One | | Marker Two | |
|-------|----------------------------|-----------------------------|----------------------------|-----------------------------|
| | First Assigned Grade | Second Assigned Grade | First Assigned Grade | Second Assigned Grade |
| | 1 | 2 | 3 | 4 |
| 6 | 3 | 3 | 4 | 4 |
| 12 | 7 | 7 | 3 | 5 |
| 18 | 4 | 4 | 5 | 4 |
| 24 | 3 | 2 | 1 | 2 |
| 30 | 3 | 4 | 3 | 3 |
| 36 | 2 | 3 | 4 | 5 |
| 42 | 3 | 4 | 2 | 3 |
| 48 | 3 | 3 | 4 | 5 |
| 54 | 5 | 5 | 5 | 6 |
| 60 | 3 | 4 | 4 | 5 |
| 66 | 3 | 4 | 4 | 4 |
| 72 | 2 | 3 | 3 | 2 |
| 78 | 2 | 3 | 2 | 3 |
| 84 | 4 | 3 | 2 | 3 |
| 90 | 5 | 7 | 5 | 5 |
| 96 | 3 | 3 | 2 | 4 |
| 102 | 4 | 6 | 4 | 4 |
| 108 | 3 | 3 | 3 | 2 |
| 114 | 4 | 5 | 3 | 4 |
| 120 | 5 | 4 | 5 | 6 |

Correlations (r): 1 and 2: 0.77
 3 and 4: 0.73
 1 and 3: 0.34
 2 and 4: 0.50

IV. TREATMENT OF THE DATA

After the tests were scored and 15%, chosen at random, had been rechecked by an independent marker to ensure the reliability of the original scoring, the scores were transferred to IBM cards so that they could be processed through the IBM 1620 computer in the University of Alberta Computing Center. Two different programs were used:

1. a program which produced means, standard deviations and correlations for various combinations of data; and
2. a program which made two-way analyses of variance of selected data, the analyses by the least-squares method adjusted for different cell frequencies.

V. SIGNIFICANCE LEVEL

The level of significance used throughout the investigation was the 0.05 level.

CHAPTER IV

RELATIONSHIPS AMONG THE TESTS

I. INTRODUCTION

The relationships among the tests, particularly the relationship of the Transformational Grammar Test to the other three tests, were examined for similarities and differences, first of all for senior high school students and then for the combined junior and senior high school students. The particular relationships that were the subject of the first two hypotheses underlying the investigation were expressed in a series of null hypotheses. Each of these null hypotheses is dealt with in turn in the rest of the chapter.

II. FOR STUDENTS

Null Hypothesis 1.a.

There are no significant relationships among the abilities measured by the Transformational Grammar Test, the Traditional Grammar Test, the Analogies Test and the Essay Test for all students in grades X, XI and XII.

Table IX shows the Pearson product-moment coefficients of correlation for the four tests for all students in grades X to XII. The correlations are all between 0.51 and 0.58 and all are significant. Consequently, the null hypothesis is rejected for all tests. There are, therefore, significant positive relationships among the abilities measured by the tests.

While the correlations are not particularly high, they are a little higher than those reported by O'Donnell in his investigation of relationships among essay writing ability, grammatical ability and

ability to recognize structural relationships.¹ O'Donnell reported correlations of 0.39 between essay scores and grammar scores, and 0.42 between essay scores and structural relationship scores for 201 subjects. In this investigation the corresponding correlations are 0.52 and 0.54 for 120 subjects.

TABLE IX

SIGNIFICANT CORRELATIONS FOR 120 STUDENTS AMONG
SCORES ON FOUR TESTS (X TO XII)

| | Traditional Grammar Test | Analogies Test | Essay Test |
|----------------------------------|--------------------------------|-------------------|---------------|
| Transformational Grammar Test | 0.54 | 0.58 | 0.54 |
| Traditional Grammar Test | | 0.57 | 0.52 |
| Analogies Test | | | 0.51 |

The correlation between the Analogies Test scores and the Transformational Grammar Test scores (0.58) is not significantly different from the correlations between the Analogies Test scores and the Traditional Grammar Test scores (0.57) and the Analogies Test scores and the Essay Test scores (0.51). The influence of the exclusive use of analogy in item constructions in the Transformational Grammar Test does not, therefore, appear to have inflated the correlation to any great extent. All tests sample some common factor but that factor does not appear to be as specific a factor as the ability to deal with analogies; it is more likely a general intelligence or language ability factor.

¹R. C. O'Donnell, "The Correlation of Awareness of Structural Relationships in English and Ability in Written Composition," The Journal of Educational Research, LVII:9(May-June, 1964), pp. 464-467.

Null Hypothesis 1.b.

There are no significant relationships among the abilities measured by the Transformational Grammar Test, the Traditional Grammar Test, the Analogies Test and the Essay Test for students within each of three grade levels, X, XI and XII.

Table X shows the Pearson r correlations among the four tests within the various grade levels, X, XI and XII. It is noted that in only one case, in grade XI for the Analogies Test scores and the Essay Test scores, is the correlation not significant. The null hypothesis is therefore accepted for one and rejected for seventeen of the relationships. There are, therefore, significant positive relationships among the tests within grade levels on seventeen of eighteen possible occasions.

TABLE X

SIGNIFICANT CORRELATIONS WITHIN THE GRADE LEVELS
AMONG SCORES ON FOUR TESTS (X TO XII)

| | Traditional Grammar Test | Analogies Test | Essay Test |
|----------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Transformational Grammar Test | XII 0.54 XI 0.39 X 0.65 | XII 0.71 XI 0.43 X 0.53 | XII 0.60 XI 0.46 X 0.53 |
| Traditional Grammar Test | | XII 0.57 XI 0.47 X 0.58 | XII 0.65 XI 0.37 X 0.47 |
| Analogies Test | | | XII 0.62 X 0.42 |

The significant correlations range from the lowest one of 0.37 for the grade XI correlation between the Traditional Grammar Test scores and the Essay Test scores to the highest, 0.71, in grade XII between the Transformational Grammar Test scores and the Analogies Test scores. The correlations in Table X do show one consistent

pattern: in every case those for the grade XI students are lower than those for either the grade X or XII students, though in no case was the difference found to be significant.

Null Hypothesis l.c.

There are no significant relationships among the abilities measured by the Transformational Grammar Test, the Traditional Grammar Test, the Analogies Test and the Essay Test for students within each of three ability levels, high, mid and low, in grades X, XI and XII.

Table XI shows that within the various ability levels in grades X, XI and XII there are only five significant correlations and four of these are for the mid ability level. The null hypothesis is therefore accepted for thirteen of the relationships and rejected for five. There are, therefore, only five significant positive relationships out of a possible eighteen among the tests within ability levels. The highest of the significant correlations, 0.38, is between the Transformational Grammar Test scores and the Traditional Grammar Test scores for the high ability level, and the lowest of the significant correlations, 0.26, is between the Transformational Grammar Test scores and the Analogies Test scores for the mid ability level. It is also interesting to observe that two of the five significant correlations are between the two grammar tests, and that the Essay Test scores correlate significantly with only one other set of test scores, those of the Transformational Grammar Test. In two cases, even with a group of sixty students, there is still no significant correlation between the Essay Test and the Traditional Grammar Test or between the Essay Test and the Analogies Test.

Once grouping has been carried out on the basis of

intelligence and achievement, it appears that in most cases the students within the resulting groups perform rather like each other on the four tests. There is also little likelihood that within the resulting ability level groups of even thirty to sixty students so selected that significant and, if significant, any but fairly low correlations will be found.

TABLE XI
SIGNIFICANT CORRELATIONS WITHIN THE ABILITY LEVELS
AMONG SCORES ON FOUR TESTS (X TO XII)

| | Traditional Grammar Test | Analogs Test | Essay Test |
|----------------------------------|-----------------------------|-----------------|---------------|
| Transformational Grammar Test | High 0.38 Mid 0.37 | Mid 0.26 | Mid 0.29 |
| Traditional Grammar Test | | Mid 0.32 | |
| Analogs Test | | | |

III. FOR PREDICTION

Null Hypothesis 2.

The correlation between scores on the Transformational Grammar Test and scores on the Essay Test is not significantly higher than the correlation between scores on the Traditional Grammar Test and scores on the Essay Test.

Figures 2 to 4 further analyze the data for all students in grades X, XI and XII to show certain bivariate frequency distributions and regression equations. Figures 5 to 8 show the distributions of the raw scores of each of the four tests. From these

distributions, it can be seen that the Transformational Grammar Test produced a slightly negatively skewed distribution of total scores, the Essay Test a slightly positively skewed distribution, and both the Traditional Grammar Test and the Analogies Test near normal distributions. In view of the facts that the sample population was small (120 students) and that it was stratified into highly differentiated matched groups, this slight skewness in two of the four distributions is not surprising.

Figure 2, the bivariate frequency distribution for the Essay Test and the Transformational Grammar Test, is worthy of comment. The raw scores for the Essay Test produced a slightly positively skewed distribution whereas those for the Transformational Grammar Test produced a slightly negatively skewed distribution. Although regression equations were first calculated, and are given in Figure 2, for the bivariate frequency distribution on the assumption that the regression lines did not depart significantly from linearity, the actual bivariate frequency distribution in Figure 2, together with the distribution of raw scores in figures 5 and 8, indicated that the data should be subjected to a further analysis using the correlation ratio rather than the correlation coefficient. Table XII shows the resulting calculation which produced an eta coefficient of 0.64. The F test was used to compare the eta and r coefficients and the resulting value of 2.42 exceeded the 0.05 value of 1.97. The regression is, therefore, significantly non-linear and the 0.64 eta coefficient is a closer estimate of the actual relationship than the 0.54 r coefficient.

essay
test:
raw
scores

| | 14-16 | 17-19 | 20-22 | 23-25 | 26-28 | 29-31 | 32-34 | 35-37 | 38-40 | 41-43 | 44-46 | n |
|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| 14 | | | | | | | | | | 2 | | 2 |
| 13 | | | | | | | | | | | | |
| 12 | | | | | | | | | 2 | 2 | | 4 |
| 11 | | | | | | | | | 1 | 4 | 1 | 6 |
| 10 | | | | | | | 2 | 2 | 3 | 2 | | 9 |
| 9 | | | | | 1 | | 2 | 5 | 3 | 2 | 1 | 14 |
| 8 | | | 1 | 1 | | 1 | 5 | 2 | 1 | 4 | | 15 |
| 7 | | | 1 | 1 | 1 | 6 | 6 | 4 | 5 | | 2 | 26 |
| 6 | | 1 | 1 | 1 | 1 | 4 | 4 | 1 | 3 | | 1 | 17 |
| 5 | 1 | 1 | 1 | | 6 | 4 | 4 | 2 | | | | 19 |
| 4 | | | | 1 | | 3 | 1 | 1 | 2 | | | 8 |
| n | 1 | 2 | 4 | 4 | 9 | 18 | 24 | 17 | 20 | 16 | 5 | 120 |

X: Transformational Grammar Test: Raw Scores

Regression Equations:

$$Y = 0.19X + 0.98$$

$$X = 1.57Y + 22.11$$

FIGURE 2

ESSAY TEST SCORES AND TRANSFORMATIONAL GRAMMAR TEST SCORES: BIVARIATE
FREQUENCY DISTRIBUTION AND REGRESSION EQUATIONS FOR 120
STUDENTS (X TO XII)

| | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 | 75-79 | n |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| Essay Test: Raw Scores | 14 | | | | | | | | 1 | 1 | | 2 |
| | 13 | | | | | | | | | | | |
| | 12 | | | 1 | | | | 1 | 1 | 1 | | 4 |
| | 11 | | | | | | 3 | | 2 | 1 | | 6 |
| | 10 | | | 1 | 1 | | 3 | 4 | | | | 9 |
| | 9 | | | 2 | 2 | 3 | 2 | 3 | 1 | | 1 | 14 |
| | 8 | | 3 | 2 | 4 | | 2 | | 2 | 1 | 1 | 15 |
| | 7 | 1 | 4 | 5 | 3 | 6 | 3 | 3 | 1 | | | 26 |
| | 6 | 1 | 2 | 7 | 1 | 1 | 3 | 1 | | 1 | | 17 |
| | 5 | 1 | 3 | 4 | 4 | 2 | 3 | 1 | 1 | | | 19 |
| | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | 8 |
| n | 2 | 6 | 14 | 23 | 14 | 14 | 18 | 14 | 8 | 5 | 2 | 120 |

X: Traditional Grammar Test: Raw Scores

Regression Equations:

$$Y = 0.10X + 2.35$$

$$X = 2.72Y + 30.47$$

FIGURE 3

ESSAY TEST SCORES AND TRADITIONAL GRAMMAR TEST SCORES: BIVARIATE
FREQUENCY DISTRIBUTION AND REGRESSION EQUATIONS
FOR 120 STUDENTS (X TO XII)

| | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 | 75-79 | 80-84 | 85-89 | 90-94 | n |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| essay test: raw scores | | | | | | | | | | | | 2 | | 2 |
| 14 | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | |
| 12 | | | | | | | 1 | | | 1 | 2 | | | 4 |
| 11 | | | | | | | | | | 2 | 1 | 3 | | 6 |
| 10 | | | | | 1 | 2 | | 1 | 1 | 1 | 1 | | 2 | 9 |
| 9 | | | | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 4 | | | 14 |
| 8 | | 1 | | 1 | | 3 | 3 | 1 | 2 | 4 | | | | 15 |
| 7 | | | 2 | | 5 | 1 | 4 | 4 | 7 | 1 | 1 | 1 | | 26 |
| 6 | | | 1 | 2 | 1 | 2 | 3 | 5 | 2 | | | 1 | | 17 |
| 5 | 1 | | | | 3 | 6 | 4 | 3 | 2 | | | | | 19 |
| 4 | | | | 2 | | 3 | 2 | | | 1 | | | | 8 |
| n | 1 | 1 | 3 | 6 | 11 | 18 | 18 | 16 | 16 | 12 | 9 | 7 | 2 | 120 |

X: Analogies Test: Raw Scores

Regression Equations:

$$Y = 0.09X + 1.50$$

$$X = 2.82Y + 44.69$$

FIGURE 4

ESSAY TEST SCORES AND ANALOGIES TEST SCORES: BIVARIATE FREQUENCY
DISTRIBUTION AND REGRESSION EQUATIONS FOR
120 STUDENTS (X TO XII)

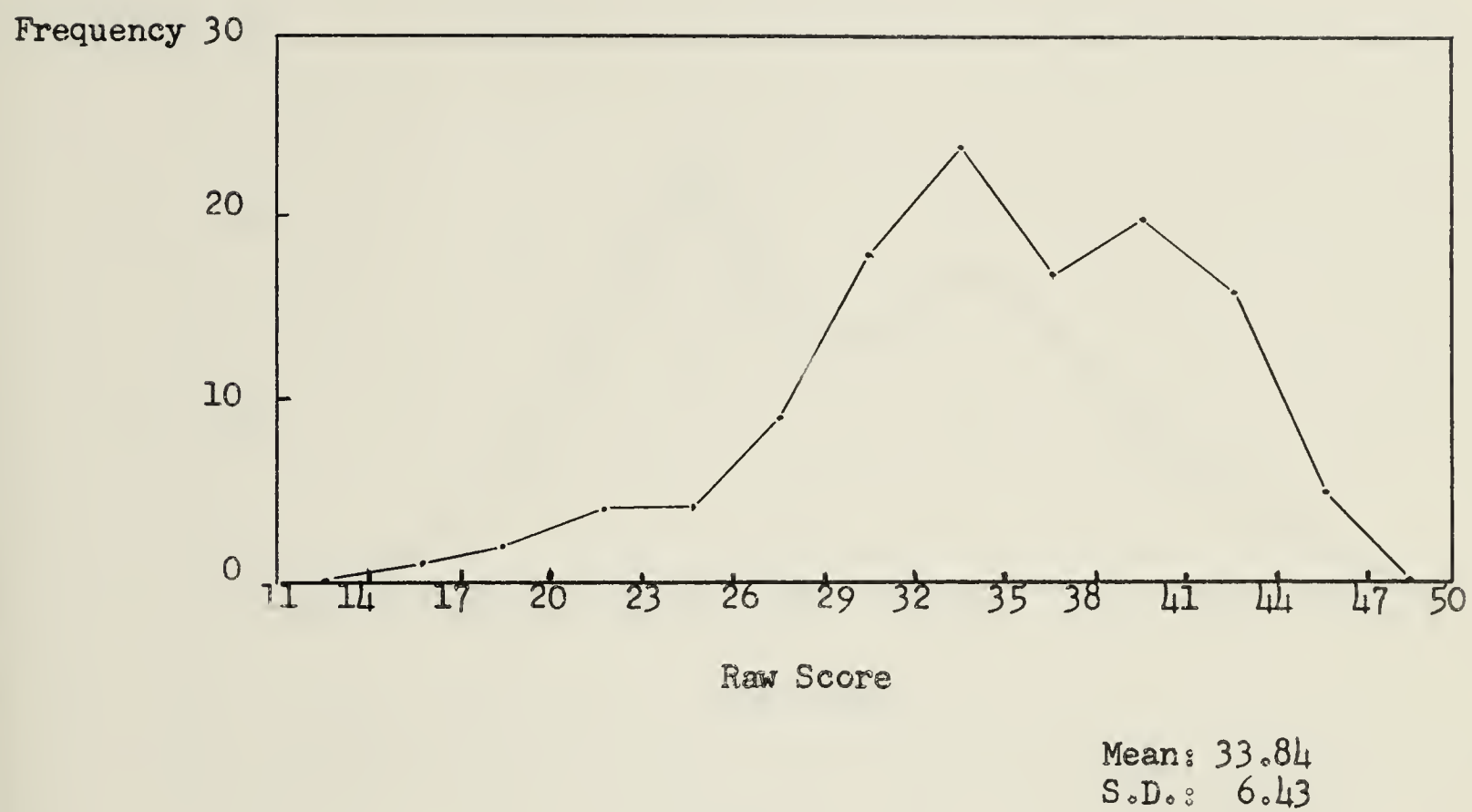
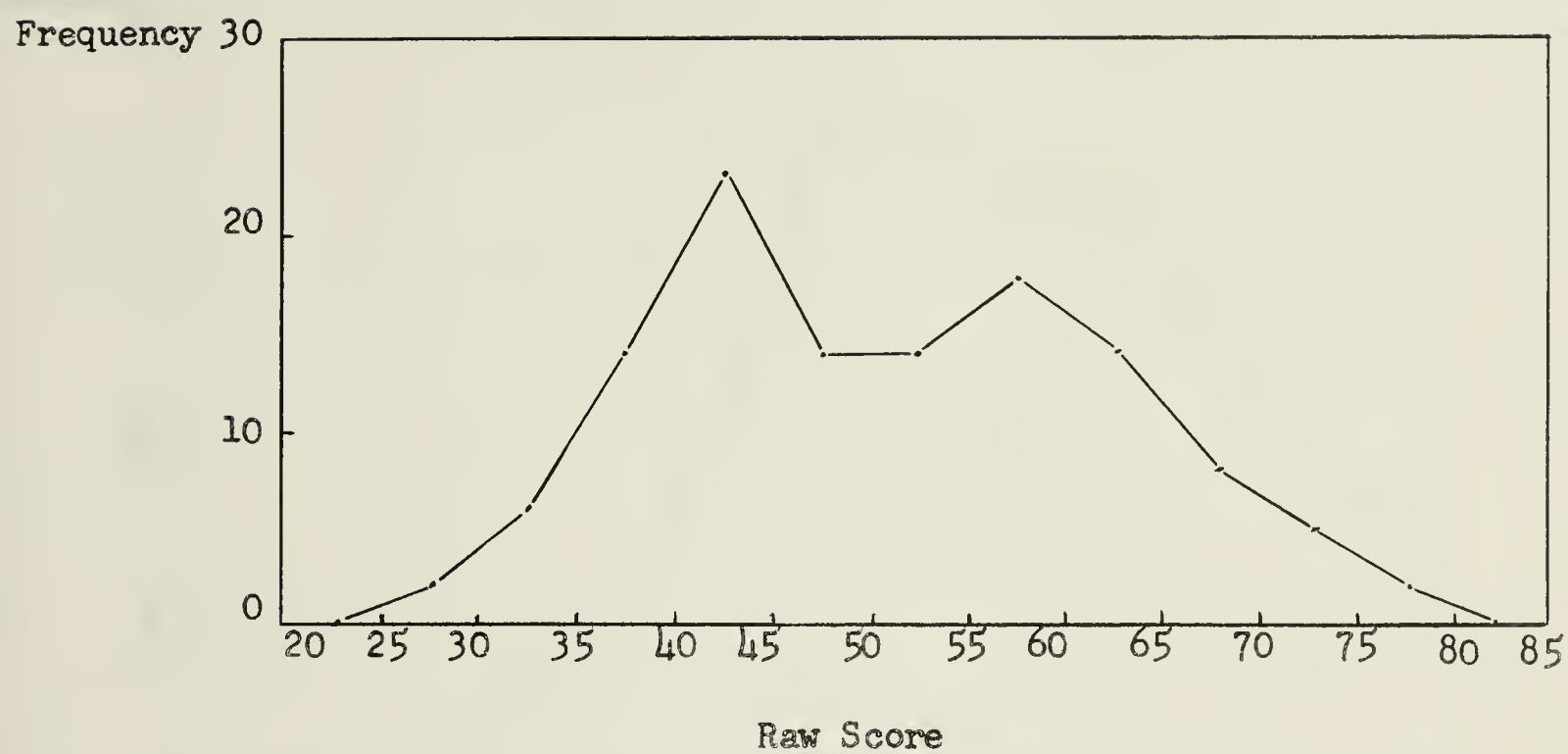


FIGURE 5

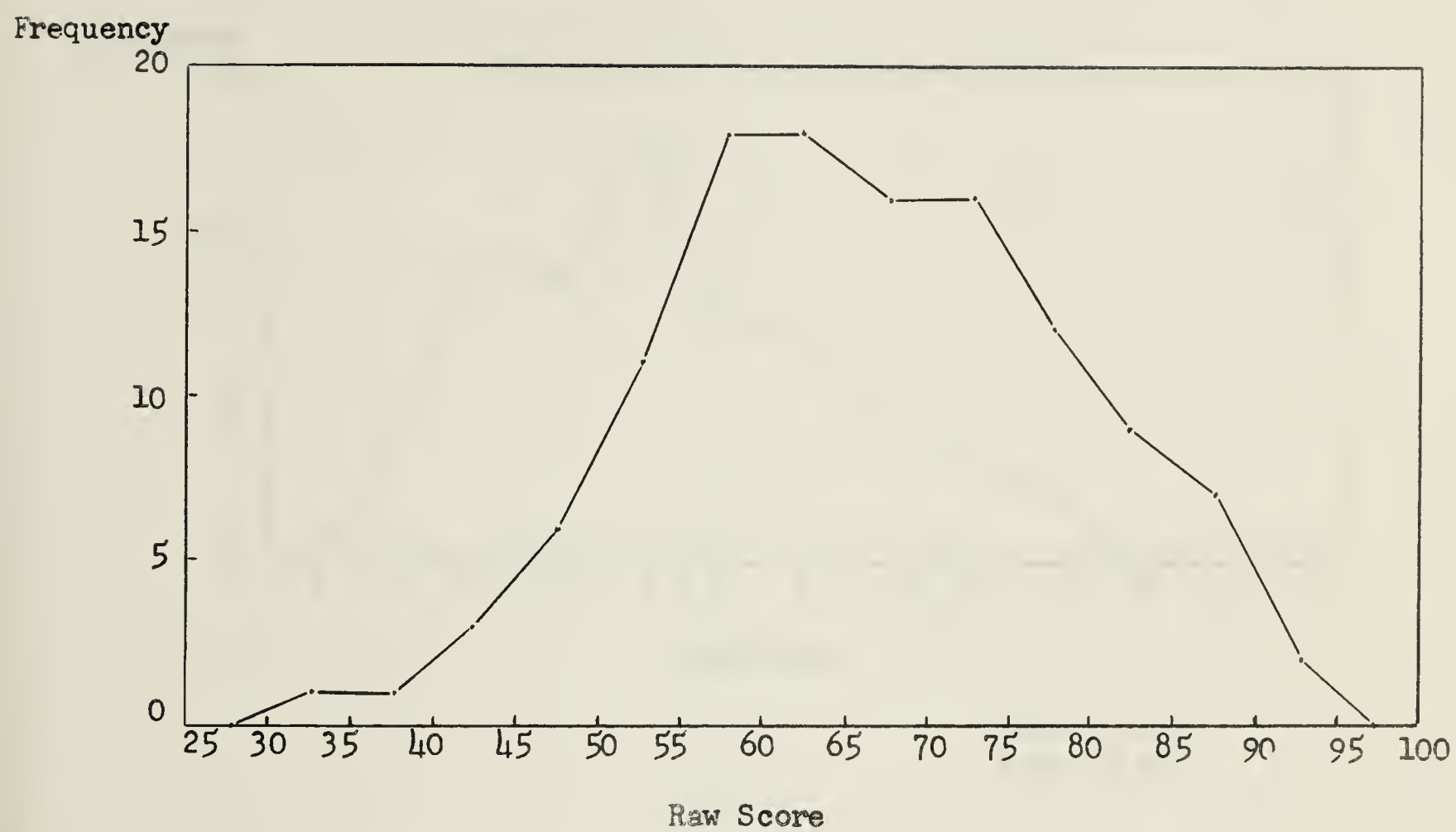
TRANSFORMATIONAL GRAMMAR TEST: DISTRIBUTION OF
RAW SCORES FOR 120 STUDENTS (X TO XII)



Mean: 50.63
S.D.: 11.62

FIGURE 6

TRADITIONAL GRAMMAR TEST: DISTRIBUTION OF
RAW SCORES FOR 120 STUDENTS (X TO XII)



Mean: 65.69
S.D.: 12.26

FIGURE 7

ANALOGIES TEST: DISTRIBUTION OF RAW SCORES
FOR 120 STUDENTS (X TO XII)



Mean: 7.41
S.D.: 2.22

FIGURE 8

ESSAY TEST: DISTRIBUTION OF RAW SCORES
FOR 120 STUDENTS (X TO XII)

TABLE XII

ESSAY TEST SCORES AND TRANSFORMATIONAL GRAMMAR TEST SCORES: ETA
COEFFICIENT (CORRELATION RATIO) FOR ESSAY TEST
FROM TRANSFORMATIONAL GRAMMAR TEST

| X | n_c | Y^1 | $Y^1 - M_y$ | $(Y^1 - M_y)^2$ | $n_c (Y^1 - M_y)^2$ |
|-------|-------|-------|-------------|-----------------|---------------------|
| 44-46 | 5 | 8.00 | 0.59 | 0.35 | 1.74 |
| 41-43 | 16 | 10.38 | 2.97 | 8.82 | 141.13 |
| 38-40 | 20 | 8.05 | 0.64 | 0.41 | 8.19 |
| 35-37 | 17 | 7.59 | 0.18 | 0.03 | 0.55 |
| 32-34 | 24 | 7.00 | 0.41 | 0.17 | 4.03 |
| 29-31 | 18 | 5.89 | 1.52 | 2.31 | 41.59 |
| 26-28 | 9 | 5.78 | 1.63 | 2.66 | 23.91 |
| 23-25 | 4 | 6.25 | 1.16 | 1.35 | 5.38 |
| 20-22 | 4 | 6.50 | 0.91 | 0.83 | 3.31 |
| 17-19 | 2 | 5.50 | 1.91 | 3.65 | 7.30 |
| 14-16 | 1 | 5.00 | 2.41 | 5.81 | 5.81 |

$$\sum n_c (Y^1 - M_y)^2 = 242.94$$

$$\sigma^2_{Y^1} = 2.025$$

$$\sigma_{Y^1} = 1.42$$

$$\eta_{yx} = 0.64$$

Each of the other two bivariate frequency distributions in Figures 3 and 4 involving the Essay Test was examined in the same way to see if either of the eta coefficients resulted in a rejection of the hypothesis that the regression line did not depart significantly from linearity. For the comparisons of eta and r coefficients, the F test revealed values of 0.55 for the Essay Test and the Traditional Grammar Test and 1.74 for the Essay Test and Analogies Test. Since neither value was significant at the 0.05 level, the null hypothesis, that the regression line did not depart significantly from linearity, was accepted in each case. The r coefficients are, therefore, acceptable estimates of the relationships between the variables.

Since eta coefficients are by their very nature slightly inflated over r coefficients,² it is not possible to compare directly the 0.64 eta coefficient between the Essay Test and the Transformational Grammar Test and the 0.52 and 0.51 r coefficients between the Essay Test and the Traditional Grammar Test and the Essay Test and the Analogies Test respectively. The three eta coefficients are, however, more directly comparable: 0.64 for the Essay Test from the Transformational Grammar Test; 0.55 for the Essay Test from the Traditional Grammar Test; and 0.60 for the Essay Test from the Analogies Test. These suggest that the Essay Test scores are a little more predictable from the Transformational Grammar Test scores than from the Traditional Grammar Test scores and the Analogies Test scores when the non-linearity of the relationship between scores on the Essay Test and the

²J. P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw-Hill Book Co., Inc., 1956), p.295.

Transformational Grammar Test scores is taken into account. The differences between pairs of eta coefficients themselves, 0.64 for predicting Essay Test scores from Transformational Grammar Test Scores and 0.55 for predicting Essay Test scores from Traditional Grammar Test scores, however, were not found to be significant. The null hypothesis is therefore accepted. Scores on the Transformational Grammar Test do not predict scores on the Essay Test any better than do scores on the Traditional Grammar Test.

IV. SUMMARY AND CONCLUSIONS

For the 120 students in grades X to XII, there are significant positive correlations among the abilities measured by the four tests. Thus, the first hypothesis with which the investigation was concerned is confirmed. However, the correlations show that the relationships among the abilities are not close since none was higher than 0.58; the tests, therefore, tend to measure different abilities.

Seventeen of the eighteen relationships within grade levels proved to be significant. In contrast with the ability level groups, the grade level groups obviously exhibited a much wider range of abilities, and the relative and consistent superiority and inferiority of performances was revealed even in groups of forty on seventeen of the eighteen possible occasions. None of the significant correlations, however, proved to be higher than 0.71 and most were much lower than this. As with all students, no particular pair of tests were more closely related to each other than any other pair.

Only five of the eighteen relationships within ability levels were significant since it appears that within groups as small as thirty, whose members are closely matched by intelligence, students perform much like each other on the various tests, and that within the narrow range of performance so exhibited there is little consistency between pairs of tests in superior and inferior performance. For groups of sixty, relative superiority and inferiority is more likely to be noticeable, though even in this case on two occasions, with the Essay Test and the Traditional Grammar Test and the Essay Test and the Analogies Test, it was not apparent.

For all senior high school students, no two tests show any significantly closer relationship to each other than any other two, the correlations all ranging from 0.51 to 0.58. Though such correlations have little predictive value for individuals, they do have some value for groups. For the 120 students, the relationship between one pair of tests, the Essay Test and the Transformational Grammar Test, produced a non-linear regression, but the resulting eta coefficient (0.64), while significantly different from the r coefficient, was still not significantly higher than the equivalent correlation coefficients between other pairs of tests, particularly between the Essay Test and the Traditional Grammar Test. Consequently, the second hypothesis with which the investigation was concerned is not confirmed.

The investigation of relationships suggests that the Transformational Grammar Test does measure an ability which is not measured by any of the other tests and does measure, to some extent, some of the abilities the other tests do measure. This fact accounts for the support that the investigation gives to the first hypothesis

that there are positive correlations among the tests. Whilst the correlation coefficients show that scores on the terminology-free Transformational Grammar Test predict scores on the Essay Test as well as do scores on the Traditional Grammar Test, a comparison of the correlation coefficients shows that they do not do this significantly better. There is one important factor to be taken into account in evaluating this finding which does not support the second hypothesis that such a superiority would be shown. A deliberately "weak" position was taken in the investigation, i. e. that even though transformational grammar had not been taught to the students, their scores on a Transformational Grammar Test would, nevertheless, still predict their scores on an Essay Test better than would their scores on a Traditional Grammar Test. The Transformational Grammar Test scores proved to be equally as good predictors as the Traditional Grammar Test scores in this investigation. If transformational grammar had been taught to the students before the testing, and deliberately taught to improve their composition ability, the predictive value of the Transformational Grammar Test scores might well have been higher, even significantly higher, than the predictive value of the Traditional Grammar Test scores. However, the Transformational Grammar Test failed to exhibit a high degree of relationship between grammatical ability and composition ability with students who had not been taught transformational grammar. On the other hand, the results clearly cannot be interpreted to mean that there is no such relationship.

CHAPTER V

GRADE LEVEL AND ABILITY LEVEL DIFFERENCES

I. INTRODUCTION

Table XIII contains the mean total scores and standard deviations for all four tests, for all students and for students by grade levels. Table XIV contains the mean total scores and standard deviations for all four tests for students by ability levels. In Table XV, the scores are further analyzed by groups within grades. These tables and the raw scores in Appendix H contain the data needed for the analysis of grade and ability differences in order to test two of the hypotheses underlying the investigation.

TABLE XIII

TOTAL TEST SCORES: MEANS AND STANDARD DEVIATIONS
BY GRADE LEVELS (VIII TO XII)

| Grade Level | Transformational Grammar Test | | Traditional Grammar Test | | Analogies Test | | Essay Test | |
|-------------|-------------------------------|------|--------------------------|-------|----------------|-------|------------|------|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| XII | 34.61 | 6.63 | 53.18 | 10.80 | 69.28 | 12.57 | 8.00 | 2.66 |
| XI | 34.34 | 6.00 | 51.48 | 10.87 | 66.33 | 10.45 | 7.33 | 1.97 |
| X | 32.59 | 6.46 | 47.25 | 12.34 | 61.48 | 12.37 | 6.90 | 1.79 |
| VIII | 26.80 | 7.41 | | | | | | |
| All (X-XII) | 33.84 | 6.43 | 50.63 | 11.62 | 65.69 | 12.26 | 7.41 | 2.22 |

TABLE XIV

TOTAL TEST SCORES: MEANS AND STANDARD DEVIATIONS
BY ABILITY LEVELS (X TO XII)

| Ability Level | Transformational Grammar Test | | Traditional Grammar Test | | Analogies Test | | Essay Test | |
|---------------|-------------------------------|------|--------------------------|------|----------------|------|------------|------|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| High | 39.85 | 3.38 | 63.67 | 6.93 | 80.40 | 6.90 | 9.70 | 1.95 |
| Mid | 33.56 | 5.35 | 46.27 | 9.51 | 63.05 | 9.12 | 6.93 | 1.78 |
| Low | 28.40 | 5.57 | 46.33 | 9.22 | 56.27 | 8.27 | 6.07 | 1.44 |

TABLE XV

TOTAL TEST SCORES: MEANS AND STANDARD DEVIATIONS
BY GROUPS (VIII TO XII)

| Ability Level | Grade Level | Transformatl. Grammar Test | | Traditional Grammar Test | | Analogies Test | | Essay Test | |
|----------------------|-------------|----------------------------|------|--------------------------|-------|----------------|-------|------------|------|
| | | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| High | XII | 41.35 | 2.12 | 64.80 | 6.93 | 84.40 | 4.92 | 11.70 | 1.35 |
| | XI | 38.45 | 4.20 | 61.70 | 5.04 | 80.10 | 6.39 | 8.80 | 1.72 |
| | X | 39.75 | 2.95 | 64.50 | 8.45 | 76.70 | 6.91 | 8.60 | 0.80 |
| | VIII | 33.05 | 5.03 | | | | | | |
| | All (X-XII) | 39.85 | 3.38 | 63.67 | 6.93 | 80.40 | 6.90 | 9.70 | 1.95 |
| Mid | XII | 33.95 | 6.25 | 48.50 | 9.64 | 67.90 | 8.80 | 6.85 | 1.59 |
| | XI | 34.98 | 4.35 | 47.80 | 10.46 | 63.10 | 6.85 | 7.25 | 1.97 |
| | X | 31.75 | 4.75 | 42.50 | 6.90 | 58.15 | 8.80 | 6.70 | 1.71 |
| | VIII | 24.35 | 6.52 | | | | | | |
| | All (X-XII) | 33.56 | 5.35 | 46.27 | 9.51 | 63.05 | 9.12 | 6.93 | 1.78 |
| Low | XII | 29.20 | 4.22 | 50.90 | 7.48 | 56.90 | 8.19 | 6.60 | 1.80 |
| | XI | 28.95 | 6.54 | 48.60 | 9.31 | 59.00 | 6.12 | 6.00 | 0.89 |
| | X | 27.05 | 5.47 | 39.50 | 6.31 | 52.90 | 9.04 | 5.60 | 1.28 |
| | VIII | 23.45 | 7.50 | | | | | | |
| | All (X-XII) | 28.40 | 5.57 | 46.33 | 9.22 | 56.27 | 8.27 | 6.07 | 1.44 |
| All Students (X-XII) | | 33.84 | 6.43 | 50.63 | 11.62 | 65.69 | 12.26 | 7.41 | 2.22 |

The total scores on each of the four tests and all the subtest scores of the Transformational Grammar Test were subjected to two-way analyses of variance, least-squares method adjusted for unequal cell frequencies, to determine the grade level, ability level and interaction effects.

Before the two-way analyses were programed for the computer, the variances, within grade levels and within ability levels, were tested for homogeneity, according to the null hypothesis that:

$$\sigma_1^2 = \sigma_2^2 = \dots = \sigma_k^2$$

Hartley's Test¹ was used for comparisons of variances within grade levels, since the numbers of observations in each treatment class were equal, and Bartlett's Test² was used for comparisons of variances within ability levels, since the numbers of observations in each treatment class were unequal. In each case the null hypothesis was found to be acceptable at the 0.05 level. Consequently, the variances within each treatment class were homogeneous and a basic assumption underlying the analysis of variance was met.

II. TRADITIONAL GRAMMAR TEST, ANALOGIES TEST AND ESSAY TEST

Null Hypotheses 3.a. and 3.b.

On each of the Traditional Grammar Test, the Analogies Test and the Essay Test there are no significant differences in the performances of all students in grades X, XI and XII by grade level.

On each of the Traditional Grammar Test, the Analogies Test and

¹B. J. Winer, Statistical Principles in Experiment Design (New York: McGraw-Hill Book Co., Inc., 1962), pp.93-94.

²Ibid., pp.95-96.

the Essay Test there are no significant differences in the performances of all students in grades X, XI and XII by ability level.

The results of the analyses of variance for the total scores of the Traditional Grammar Test, the Analogies Test and the Essay Test for students in grades X, XI and XII are given in Table XVI. For all these tests, the F values are significant for all effects: grade level, ability level, and interaction; therefore, both null hypotheses are rejected for these three tests. Senior high school students grouped by both grade level and ability level perform significantly differently according to both kinds of grouping on the Traditional Grammar Test, the Analogies Test and the Essay Test.

TABLE XVI

OBSERVED F VALUES FOR ANALYSES OF VARIANCE OF
THREE TESTS (X TO XII): TRADITIONAL GRAMMAR TEST,
ANALOGIES TEST AND ESSAY TEST

| Source | df | F .95 | Observed F Values | | |
|---------------|-----|----------|-----------------------------|-------------------|---------------|
| | | | Traditional Grammar Test | Analogies Test | Essay Test |
| Grade Level | 2 | 3.08 | 5.04 | 9.80 | 4.59 |
| Ability Level | 2 | 3.08 | 45.98 | 75.59 | 42.01 |
| Interaction | 4 | 2.45 | 29.34 | 28.54 | 31.84 |
| Error | 111 | | | | |

However, with the significant interaction effects shown in all the tests, including the Transformational Grammar Test, it is not possible to accept the assumption of simple additivity: all that can be said is that averaged over all the grade levels and all the ability levels in all the tests, except, as will be noted, the Transformational Grammar Test for grade levels, the grade XII students perform

significantly better than the grade X students and the high ability level students perform better than the low ability level students. Within any particular grade or ability level, the superiority of one group to an adjacent group is not necessarily established.³

A comparison of the cell means reveals that for three of the four tests, the Transformational Grammar Test, the Analogies Test and the Essay Test, the interaction occurs in grades XI and XII at the low and mid ability levels. On two of these tests, the Transformational Grammar Test and the Essay Test, there is also interaction at the mid and high ability levels, particularly in grades XI and XII. On the fourth test, the Traditional Grammar Test, the interaction occurs in grades X and XI at all ability levels. These interactions confirm the absence of both simple additivity and an overall pattern of interaction; they also make grade and ability level comparisons necessary rather than inter-cell comparisons.

III. TRANSFORMATIONAL GRAMMAR TEST

Null Hypothesis 4.a.

On the Transformational Grammar Test and each of its subtests there are no significant differences in the performances of all students in grades X, XI and XII by grade level.

Table XVII contains the results of the analyses of variance for the subtest scores and the total scores of the Transformational Grammar Test for students in grades X to XII, and Table XVIII contains details of the various means. Table XVII shows that only

³Henry Scheffé, The Analysis of Variance (New York: John Wiley and Sons, Inc., 1959), p.94.

one of the observed F values for grade level effects is significant. Only the analysis of variance of Subtest E produced an F value which was significant at the 0.05 level. The null hypothesis is therefore accepted for the total scores and all subtest scores, except Subtest E, for which it is rejected. Only Subtest E of the Transformational Grammar Test differentiates among senior high school students by grade level.

Null Hypothesis 4.b.

On the Transformational Grammar Test and each of its subtests there are no significant differences in the performances of all students in grades X, XI and XII by ability level.

All subtest scores and the total scores of the Transformational Grammar Test for students in grades X, XI and XII produced significant F values for the ability level effects. The null hypothesis is therefore rejected. The total scores and all subtest scores of the Transformational Grammar Test differentiate among students by ability level in the senior high school.

TABLE XVII

OBSERVED F VALUES FOR ANALYSES OF VARIANCE OF TRANSFORMATIONAL
GRAMMAR TEST: SUBTEST SCORES AND TOTAL
SCORE (X TO XII)

| Source | df | F .95 | Observed F Values | | | | | | | | Total Score |
|---------------|-----|----------|-------------------|-------|-------|-------|-------|-------|-------|-------|----------------|
| | | | Subtest Scores | | | | | | | | |
| | | | A | B | C | D | E | F | G | H | |
| Grade Level | 2 | 3.08 | 0.27 | 0.55 | 2.94 | 0.81 | 3.37 | 0.87 | 2.05 | 0.84 | 1.88 |
| Ability Level | 2 | 3.08 | 15.21 | 6.48 | 15.49 | 7.86 | 3.23 | 16.22 | 24.81 | 11.04 | 39.13 |
| Interaction | 4 | 2.45 | 28.27 | 28.57 | 29.23 | 28.72 | 37.71 | 28.42 | 28.71 | 29.35 | 28.55 |
| Error | 111 | | | | | | | | | | |

TABLE XVIII

TRANSFORMATIONAL GRAMMAR TEST: MEAN SCORES OVERALL, BY GRADE LEVEL AND BY
ABILITY LEVEL FOR SUBTESTS AND TOTAL
(X TO XII)

| | All | XII | XI | X | High | Mid | Low | |
|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|------|
| S u b t e s t s | A | 4.53 | 4.59 | 4.58 | 4.41 | 5.35 | 4.58 | 3.60 |
| | B | 3.93 | 3.83 | 4.00 | 3.98 | 4.33 | 3.91 | 3.57 |
| | C | 4.79 | 4.98 | 5.03 | 4.38 | 5.83 | 4.70 | 3.93 |
| | D | 3.83 | 3.95 | 3.93 | 3.63 | 4.60 | 3.68 | 3.37 |
| | E | 3.94 | 4.18 | 3.98 | 3.68 | 4.50 | 3.90 | 3.47 |
| | F | 4.55 | 4.73 | 4.60 | 4.33 | 5.70 | 4.40 | 3.70 |
| | G | 3.80 | 3.93 | 3.90 | 3.58 | 4.57 | 3.82 | 3.00 |
| | H | 4.47 | 4.43 | 4.35 | 4.63 | 4.97 | 4.55 | 3.80 |
| Total | 33.84 | 34.61 | 34.34 | 32.59 | 39.85 | 33.56 | 28.40 | |
| n | 120 | 40 | 40 | 40 | 30 | 60 | 30 | |

Because performance on the Transformational Grammar Test was the principal concern of the investigation, the scores of the students in grades X, XI and XII were compared group by group using a nonparametric test, the Mann-Whitney U-Test.⁴ A series of one-tailed U-tests was carried out to determine whether students in "higher" grade and ability groups performed significantly better than those in "lower" grade and ability groups, e.g. all high ability students better than all low ability students; high grade X students better than mid grade X students; mid grade X students better than low grade XII students; etc. Figure 9 contains the results of this series of tests in diagrammatic form. The nonparametric approach to the data revealed that there were significant ability level differences throughout, but that only one of the grade level differences (mid grade XI students and mid grade X students) was significant. This approach, therefore, confirmed the fact that differences in performance on the Transformational Grammar Test at the senior high school level seem to be closely related to the ability criterion used in matching and hardly at all to the grade level criterion.

Null Hypothesis 5.a.i.

On the Transformational Grammar Test and each of its subtests there are no significant differences in the performances of all students in grades VIII, X, XI and XII by grade level.

⁴Sidney Siegel, Nonparametric Statistics: For the Behavioral Sciences (New York: McGraw-Hill Book Co., Inc., 1956), pp.116-127.

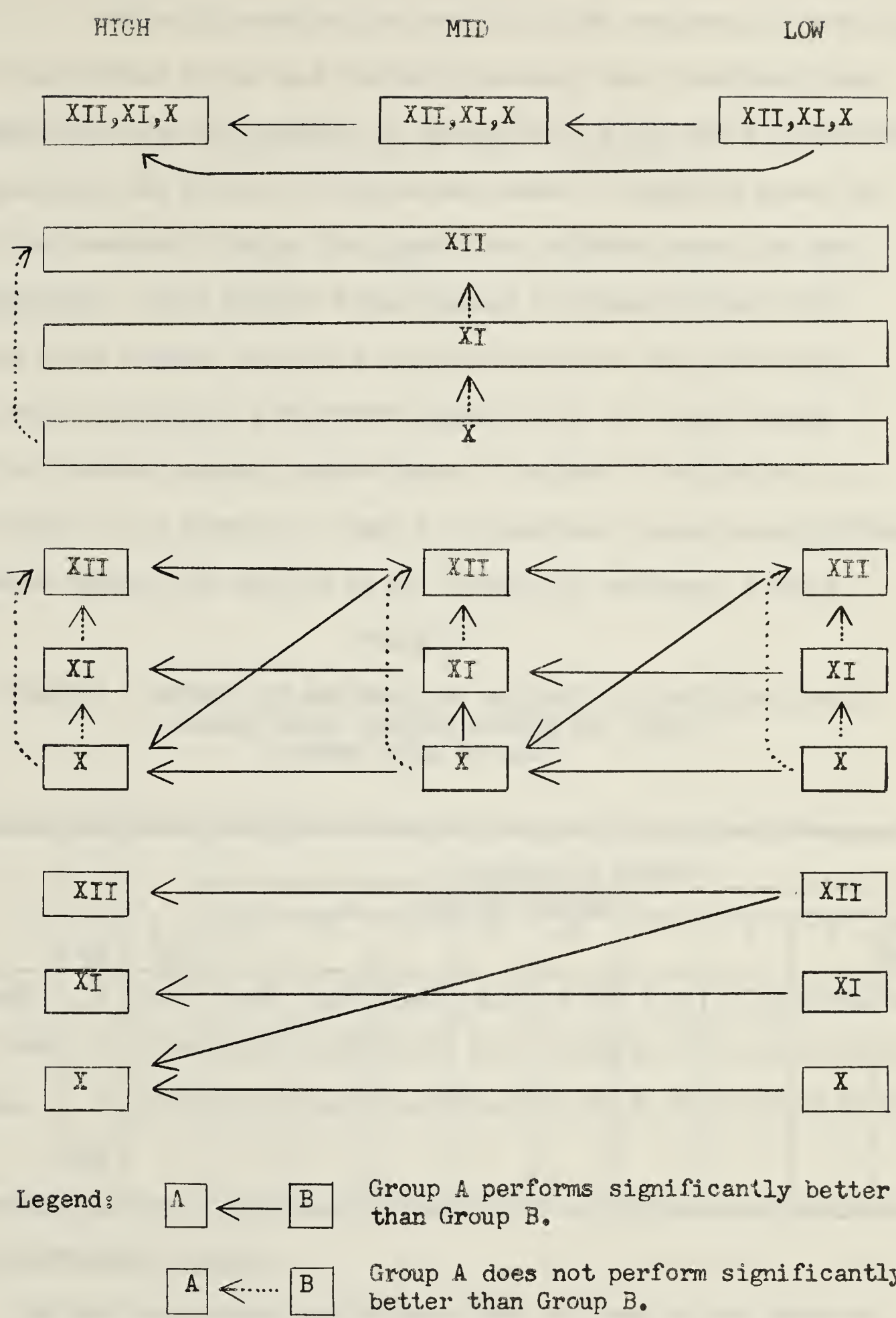


FIGURE 9

TRANSFORMATIONAL GRAMMAR TEST: COMPARISONS OF THE PERFORMANCES OF THE STRATIFIED GROUPS USING THE MANN-WHITNEY U-TEST

Table XIX contains the results of the analyses of variance for the subtest scores and the total scores of the Transformational Grammar Test for all students in grades VIII, X, XI and XII, and Table XX contains the details of the various means. Table XIX shows that all the observed F values for grade level effects except two are significant. Only Subtest B and Subtest G produced values for grade level effects which are not significant at the 0.05 level. The null hypothesis is therefore rejected for the total scores and all subtest scores, except those of Subtest B and Subtest G, for which it is accepted. There are significant grade level differences between grades VIII and XII on all except two subtests, B and G.

TABLE XIX

OBSERVED F VALUES FOR ANALYSES OF VARIANCE OF TRANSFORMATIONAL
GRAMMAR TEST: SUBTEST SCORES AND TOTAL
SCORE (VIII TO XII)

| Source | df | F .95 | Observed F Values | | | | | | | | |
|---------------|-----|----------|-------------------|-------|-------|-------|-------|-------|-------|-------|----------------|
| | | | Subtest Scores | | | | | | | | Total Score |
| | | | A | B | C | D | E | F | G | H | |
| Grade Level | 3 | 2.67 | 6.97 | 1.95 | 8.83 | 9.38 | 5.73 | 7.57 | 2.26 | 15.94 | 20.51 |
| Ability Level | 2 | 3.06 | 15.65 | 10.30 | 13.87 | 8.14 | 9.45 | 15.32 | 22.32 | 15.74 | 42.64 |
| Interaction | 6 | 2.16 | 25.64 | 25.47 | 26.09 | 25.59 | 26.04 | 25.34 | 25.39 | 26.61 | 25.67 |
| Error | 148 | | | | | | | | | | |

Null Hypothesis 5.a.ii.

On the Transformational Grammar Test and each of its subtests there are no significant differences in the performances of all students in grades VIII, X, XI and XII by ability level.

Table XIX also shows that for the ability level effects all subtest scores and the total scores produce significant F values in grades VIII to XII. The null hypothesis is therefore rejected;

there are significant ability level differences in grades VIII to XII.

TABLE XX

TRANSFORMATIONAL GRAMMAR TEST: MEAN SCORES OVERALL AND BY GRADE LEVEL FOR SUBTESTS AND TOTAL (VIII TO XII)

| | | All | XII | XI | X | VIII |
|----------|---|-------|-------|-------|-------|-------|
| Subtests | A | 4.27 | 4.59 | 4.58 | 4.41 | 3.50 |
| | B | 3.85 | 3.83 | 4.00 | 3.98 | 3.60 |
| | C | 4.50 | 4.98 | 5.03 | 4.38 | 3.61 |
| | D | 3.55 | 3.95 | 3.93 | 3.63 | 2.68 |
| | E | 3.77 | 4.18 | 3.98 | 3.68 | 3.23 |
| | F | 4.25 | 4.73 | 4.60 | 4.33 | 3.33 |
| | G | 3.70 | 3.93 | 3.90 | 3.58 | 3.40 |
| | H | 4.10 | 4.43 | 4.35 | 4.63 | 2.98 |
| Total | | 32.09 | 34.61 | 34.34 | 32.59 | 26.80 |
| n | | 160 | 40 | 40 | 40 | 40 |

Null Hypothesis 5.b.i.

On the Transformational Grammar Test and each of its subtests there are no significant differences in the performances of all students in grades VIII and X by grade level.

Because the grade VIII students had been matched individual by individual with the grade X students, the total scores and subtest scores of the Transformational Grammar Test for these two grades alone were subjected to analysis of variance. Table XXI contains a summary of the resulting F values. In all except two cases there were significant differences for grade level effects between grades VIII and X. The two subtests which did not reveal significant differences in performance were Subtest E and Subtest G, Subtest E concerned with

sentence analysis and Subtest G concerned with sentence synthesis. The null hypothesis is therefore rejected for total scores and all the subtest scores, except those of Subtest E and Subtest G, for which it is accepted. There are significant differences between the performances of students in grades VIII and X, with only two exceptions, subtests E and G.

TABLE XXI

OBSERVED F VALUES FOR ANALYSES OF VARIANCE OF TRANSFORMATIONAL GRAMMAR TEST: SUBTEST SCORES AND TOTAL SCORE (VIII AND X)

| Source | df | F .95 | Observed F Values | | | | | | | | Total Score |
|---------------|----|----------|-------------------|-------|-------|-------|-------|-------|-------|-------|----------------|
| | | | Subtest Scores | | | | | | | | |
| | | | A | B | C | D | E | F | G | H | |
| Grade Level | 1 | 3.97 | 9.54 | 4.48 | 4.99 | 11.72 | 3.20 | 8.45 | 0.37 | 31.93 | 24.77 |
| Ability Level | 2 | 3.12 | 8.32 | 8.21 | 6.10 | 4.97 | 6.80 | 5.80 | 8.74 | 7.53 | 21.87 |
| Interaction | 2 | 3.12 | 38.60 | 37.64 | 38.43 | 38.58 | 38.96 | 37.65 | 37.32 | 40.06 | 37.78 |
| Error | 74 | | | | | | | | | | |

Null Hypothesis 5.b.ii.

On the Transformational Grammar Test and each of its subtests there are no significant differences in the performances of all students in grades VIII and X by ability level.

Table XXI also shows significant F values for all ability level effects in grades VIII and X; consequently, the null hypothesis is rejected.

IV. SUMMARY AND CONCLUSIONS

The total scores of the Traditional Grammar Test, the Analogies Test and the Essay Test produced significant grade level, ability level and interaction effects in grades X, XI and XII. The total scores of the Transformational Grammar Test, however, whilst producing significant ability level and interaction effects, failed to

produce significant grade level effects in grades X, XI and XII. In the subtests of the Transformational Grammar Test too, only the scores of Subtest E produced grade level effects in addition to ability level and interaction effects.

When grade VIII students were included with the grade X, XI and XII students, significant ability level and interaction effects resulted for total scores and subtest scores. There were also significant grade level effects in all scores, except for Subtest B and Subtest G. When only grades VIII and X were compared, all effects, grade level, ability level and interaction, were significant for all scores except grade level effects for Subtest E and Subtest G.

The findings for the Traditional Grammar Test, the Analogies Test and the Essay Test confirm the third hypothesis with which the investigation was concerned, that these tests would differentiate among students in the senior high school grades by both grade and ability level. The findings indicate that grade XII students know significantly more about traditional grammar, have significantly greater ability to analogize, and write significantly better essays than do grade X students. They also indicate that high ability senior high school students excel low ability senior high school students in similar ways. However, the significant interaction effects on all the tests prohibit any finer conclusions because any particular grade XI group did not necessarily perform significantly better than the equivalent grade X group, nor did any particular mid ability level group necessarily perform significantly better than the low ability level group within the same grade.

That all these tests should have produced such findings is

not surprising since there is an obvious emphasis in the senior high school grades on the development of the abilities which these tests attempt to measure. For example, the students used in the investigation had been taught, and were being taught, traditional grammar. As a result it might be expected that their knowledge of that grammar would show an increase, even a significant one, between grades X and XII. Likewise, it might be assumed that the ability to analogize develops over the years and is helped to do so by exercises in clear thinking, logic and semantics. The investigation confirms that there is such a development within the senior high school grades. The findings also confirm that emphasis on the improvement of essay writing ability in the senior high school seems to produce significant improvement in that ability.

The significant ability level differences which were hypothesized were also found for these three tests and add full confirmation to the third hypothesis underlying the investigation that there would be such differences in addition to significant grade level differences.

The Transformational Grammar Test, on the other hand, did not produce significant grade level differences at the senior high school level, but did show significant effects for ability level grouping and interaction. The findings for this test do not, then, fully confirm the third hypothesis, except for one of the subtests, Subtest E. There are two possible explanations for this lack of support for the hypothesis: either the Transformational Grammar Test fails to measure certain abilities which do develop between grades X and XII or the abilities which it does measure do not develop during this time. That there are almost certainly some weaknesses in

the test and testing might be expected, e.g. in the item construction, in the brevity of the subtests, and in the possible low ceiling of what should be a "power" test; however, certain of the findings indicate that the alternative explanation may be more valid. It would appear that by the senior high school grades the abilities which the Transformational Grammar Test measures have reached, as it were, a plateau so far as chronological age is concerned, and that differential performance is related primarily to ability level rather than grade level. The result is that all ability level groups have stopped developing, or are developing only very slowly, in the abilities which the test measures, but they have stopped at significantly different levels, e.g. mid ability level grade X students perform significantly better than low ability level grade XII students. What actual effect on performance would result from teaching transformational grammar to these various groups may only be conjectured and would certainly be worth investigating.

To accept this second alternative is to accept to some degree a claim often made by linguists that children already have internalized much of their grammar by the time they come to school and all of it by the time they leave, regardless of whether or not they are "taught grammar" in school. Certainly, the students in this investigation revealed no significant gains in their last two years in the kinds of grammatical abilities with which the Transformational Grammar Test was concerned.

The grade VIII students were included in the investigation in order to examine the fourth hypothesis that there would be significant

differences in performance over a larger span than two years, and such significant differences were found in all but two subtests. Furthermore, these differences were actually significant between grades VIII and X. The junior high school years rather than the senior high school years seem, therefore, to be years in which the kinds of abilities measured by the Transformational Grammar Test actually do develop.

CHAPTER VI

TRANSFORMATIONAL GRAMMAR TEST

I. INTRODUCTION

The fifth major hypothesis with which the investigation was concerned was that the students' answers to the subtests and individual items of the Transformational Grammar Test would contribute something to a better understanding of the underlying grammatical theory. This chapter examines subtest and item difficulty and the types of errors made by the students in order to test this hypothesis.

II. SUBTESTS

Since, in contrast to the other subtests of the Transformational Grammar Test, Subtest B and Subtest G did not reveal significant differences in performance between grades VIII and XII, they merit further examination. Subtest B requires students to recognize different kernel sentences. There is a possible score on the subtest of 4.50. For 160 students the mean is 3.85 with the highest mean, 4.00, in grade XI and the lowest, 3.60, in grade VIII. Obviously when grade VIII students succeed in correctly identifying 80% of the correct responses, there is not much opportunity for improvement in the later grades. Therefore, the particular subtest could, perhaps, be criticized for possible failure as a "power" test. The remarkable fact, however, is that grade VIII students do succeed in identifying 80% of the correct responses, that they do quite easily distinguish the different grammatical structures of He is a kind salesman and He is a fruit salesman. Yet the teaching of traditional grammar generally seeks to obliterate the difference by calling both kind and fruit "adjectives modifying salesman." This finding would

seem to indicate that even grade VIII students are aware that at least one of the basic rules in traditional grammar is quite inaccurate because their sensitivity as to how words actually function grammatically has obviously superseded what knowledge they have of the rules of traditional grammar.

Subtest G requires students to synthesize two one-base sentences into one complex sentence.¹ There is a possible score on the subtest of 5.00. For 160 students the mean is 3.70 with the highest mean, 3.93, in grade XII and the lowest, 3.40, in grade VIII. The increase in correct responses on this subtest between the lowest and highest means of 10.6% is also the lowest of the percentage increases of the three subtests which require students to produce rather than recognize correct responses. Ability to synthesize sentences in the way required by Subtest G appears, therefore, to be slow in developing over even a four year span.

Table XXII shows that Subtest B and Subtest G are also the two subtests on which students in grade VIII perform best with a percentage of successful responses of 80% and 68% respectively.

Table XXII also shows that students, irrespective of grade or ability level, find the difficulty of the subtests very much the same, although their actual performances differ widely on the subtests according to grade and ability levels. Almost without exception all groups find subtests B, E and H the easiest subtests and subtests C and F the most difficult. However, this difficulty is a relative one

¹In transformational grammar a complex sentence is a sentence containing more than one base, or kernel, sentence.

since the high ability level students still make 81% correct responses to Subtest F and this is their lowest performance.

TABLE XXII

TRANSFORMATIONAL GRAMMAR TEST SUBTESTS: ORDER OF DIFFICULTY AND PERCENTAGE OF CORRECT RESPONSES: OVERALL, BY GRADE LEVEL, AND BY ABILITY LEVEL

| | | All VIII to XII | All X to XII | XII | XI | X | VIII | All Highs X to XII | All Mids X to XII | All Lows X to XII | |
|---------------------------|-------|--------------------------|-----------------------|-------|-------|-------|-------|-----------------------------|----------------------------|----------------------------|-------|
| Order of Difficulty | Least | 1 | B 86% | H 89% | H 89% | B 89% | H 93% | B 80% | H 99% | H 91% | B 79% |
| | | 2 | H 82 | B 87 | B 85 | H 87 | B 88 | G 68 | B 96 | B 87 | H 76 |
| | | 3 | E 75 | E 79 | E 85 | E 80 | E 74 | E 65 | D 92 | E 78 | E 69 |
| | | 4 | G 74 | D 77 | D 84 | D 79 | A 74 | H 60 | G 91 | G 76 | D 67 |
| | | 5 | A 72 | G 76 | G 79 | G 78 | D 73 | A 58 | E 90 | A 76 | G 60 |
| | | 6 | D 71 | A 76 | A 77 | A 76 | G 72 | D 54 | A 89 | D 74 | A 60 |
| | | 7 | C 64 | C 68 | C 71 | C 72 | C 63 | C 52 | C 83 | C 67 | C 56 |
| | Most | 8 | F 61 | F 65 | F 68 | F 66 | F 62 | F 48 | F 81 | F 64 | F 53 |
| Overall | | 72% | 76% | 78% | 77% | 73% | 60% | 90% | 75% | 64% | |

The three easiest subtests are Subtest B, a test of ability to recognize different kernel sentences, Subtest H, a test of ability to synthesize two kernel sentences using one of them as a phrasal modifier, and Subtest E, a test of ability to analyze two-base complex sentences into constituent kernel sentences. The two most difficult subtests are tests of ability to manipulate the passive, negative and question transformations of one base sentences either singly or in all possible combinations. Subtest C requires the recognition of the correct transformations and Subtest F their production. The fact that students find these simple transformations relatively more troublesome

than transformations which would appear to be much less simple from their place in the grammar would seem to suggest that those processes which appear to be simple and central in transformational grammar are not thereby easier to manipulate consciously by users of the language, who were not unduly pressured by time, than those processes which appear to be relatively more complicated and less central.

Subtests B, E and G are the three subtests which depart from the general pattern of revealing significant grade level differences between grades VIII and X and between grade VIII and the senior high school, but failing to reveal significant grade level differences within the senior high school grades. Subtest B does not show significant grade level differences between grade VIII and the senior high school grades. Subtest E shows significant grade level differences within the senior high school grades but none between grade VIII and grade X. Subtest G shows no significant grade level differences in any combination.

Although interaction effects and possible weaknesses in matching procedures and test construction limit the extent to which subtest scores may be interpreted, it is still possible to draw some general conclusions about the subtests of the Transformational Grammar Test.

The ability measured by Subtest B, the ability to recognize different kernel sentences, does show a significant increase between grades VIII and X, but this increase is not significant when considered against the performances of students in the whole of grades VIII to XII.

The ability measured by Subtest E, the ability to analyze sentences, shows significant increases only in the senior high school

grades.

The ability measured by Subtest G, the ability to produce a complex sentence from two given kernel sentences, shows no significant increases at all between grades VIII and XII.

The abilities measured by the remaining five subtests show significant increases between grades VIII and X, and between grades VIII and XII, but no significant increases within the senior high school grades. These abilities are as follows:

Subtest A -- the ability to recognize the kernel sentences underlying nominal compounds.

Subtest C -- the ability to recognize the passive, negative and question transformations singly and in all possible combinations.

Subtest D -- the ability to recognize the correct synthesis of two kernel sentences into a complex sentence.

Subtest F -- the ability to produce the passive, negative and question transformations singly and in all possible combinations.

Subtest H -- the ability to synthesize two kernel sentences using one of them as a phrasal modifier.

III. TEST ITEMS

The responses on the Transformational Grammar Test of all 30 students in each of the two groups most clearly differentiated by ability level, the high ability level and low ability level groups in grades X to XII, were recorded item by item in order to discover:

1. which individual test items best differentiated between the two groups, and

2. which difficulties were peculiar to the one group or the other,
and what kinds of difficulties these were.

The total numbers of correct and incorrect responses are shown in Table XXIII. The responses are further analyzed into various categories for the free responses in items 28 to 44.

Item Differentiation

In Subtest A, items 2 and 4 produced the greatest differentiation between the groups. For Item 2 the high ability level group had no difficulty in choosing response c and response d as the correct responses with 28 and 27 correct responses for the items respectively. The low ability level group gave only 14 responses to response c and 17 to response d, but gave 15 responses to response b (codfish: a fish to cod) and 7 responses to response a (foodstuff: a stuff to food). Likewise for Item 4, the low ability level group gave 14 responses to the incorrect response b (handyman: the handy has a man).

In Subtest B, no individual item appeared to be a very good discriminator; however, response 7d was given by only 19 members of the low ability level group in comparison with 28 members of the high ability level group.

In Subtest C, items 14 and 15 were the best discriminators. Response 14c was chosen correctly 23 times by the high ability level group in comparison with 11 times by the low ability level group and response 15d was chosen correctly 15 times by the high ability level group in comparison with only 4 times by the low ability level group. Although the difference on all the other items in Subtest C favored the high ability level group, in no case was it greater than by eight responses.

TABLE XXIII

RESPONSES OF HIGH AND LOW ABILITY LEVEL GROUPS (X TO XII)
ON THE TRANSFORMATIONAL GRAMMAR TEST BY ITEMS

| Item | High | Low | Item | High | Low | Item | High | Low | Item | High | Low |
|------|------|-----|------|------|-----|------|------|-----|------|------|-----|
| 1a | 28 | 25 | 13a | 29 | 28 | 25a | 0 | 2 | 35i | 30 | 28 |
| b | 7 | 2 | b | 1 | 0 | b | 0 | 0 | ii | 0 | 0 |
| c | 30 | 29 | c | 0 | 2 | c | 1 | 4 | iii | 0 | 1 |
| d | 0 | 0 | d | 0 | 3 | d | 29 | 20 | iv | 0 | 1 |
| 2a | 1 | 7 | 14a | 3 | 7 | 26a | 0 | 1 | v | 0 | 0 |
| b | 1 | 15 | b | 4 | 14 | b | 0 | 2 | 36i | 30 | 24 |
| c | 28 | 14 | c | 23 | 11 | c | 30 | 25 | ii | 0 | 4 |
| d | 27 | 17 | d | 0 | 0 | d | 0 | 2 | iii | 0 | 0 |
| 3a | 30 | 26 | 15a | 14 | 25 | 27a | 0 | 0 | iv | 0 | 2 |
| b | 30 | 27 | b | 1 | 3 | b | 11 | 8 | v | 0 | 0 |
| c | 30 | 26 | c | 0 | 2 | c | 0 | 1 | 37i | 30 | 23 |
| d | 0 | 1 | d | 15 | 4 | d | 19 | 21 | ii | 0 | 0 |
| 4a | 30 | 23 | 16a | 0 | 3 | 28i | 27 | 26 | iii | 0 | 0 |
| b | 1 | 14 | b | 29 | 24 | ii | 3 | 4 | iv | 0 | 7 |
| c | 0 | 4 | c | 0 | 1 | iii | 0 | 0 | v | 0 | 0 |
| d | 24 | 15 | d | 1 | 4 | iv | 0 | 0 | 38i | 25 | 9 |
| 5a | 1 | 4 | 17a | 0 | 6 | v | 0 | 0 | ii | 0 | 0 |
| b | 30 | 27 | b | 1 | 3 | 29i | 30 | 26 | iii | 3 | 6 |
| c | 0 | 6 | c | 0 | 2 | ii | 0 | 0 | iv | 2 | 15 |
| d | 1 | 4 | d | 29 | 21 | iii | 0 | 0 | v | 0 | 0 |
| 6a | 29 | 19 | 18a | 1 | 1 | iv | 0 | 3 | 39i | 24 | 6 |
| b | 4 | 7 | b | 1 | 5 | v | 0 | 0 | ii | 0 | 0 |
| c | 20 | 24 | c | 0 | 2 | 30i | 28 | 28 | iii | 1 | 0 |
| d | 0 | 0 | d | 28 | 23 | ii | 1 | 0 | iv | 5 | 23 |
| 7a | 2 | 3 | 19a | 29 | 24 | iii | 0 | 0 | v | 0 | 1 |
| b | 29 | 30 | b | 0 | 4 | iv | 1 | 2 | 40i | 28 | 22 |
| c | 2 | 4 | c | 1 | 2 | v | 0 | 0 | ii | 0 | 0 |
| d | 28 | 19 | d | 0 | 1 | 31i | 22 | 7 | iii | 0 | 0 |
| 8a | 0 | 2 | 20a | 0 | 3 | ii | 5 | 10 | iv | 2 | 6 |
| b | 29 | 26 | b | 0 | 2 | iii | 3 | 13 | v | 0 | 2 |
| c | 0 | 2 | c | 1 | 1 | iv | 0 | 0 | 41i | 30 | 27 |
| d | 29 | 19 | d | 29 | 24 | v | 0 | 0 | ii | 0 | 0 |
| 9a | 30 | 27 | 21a | 2 | 5 | 32i | 20 | 7 | iii | 0 | 0 |
| b | 0 | 2 | b | 27 | 18 | ii | 9 | 16 | iv | 0 | 1 |
| c | 29 | 26 | c | 1 | 4 | iii | 0 | 6 | v | 0 | 2 |
| d | 30 | 26 | d | 0 | 3 | iv | 0 | 0 | 42i | 30 | 24 |
| 10a | 0 | 0 | 22a | 0 | 3 | v | 1 | 1 | ii | 0 | 0 |
| b | 29 | 26 | b | 5 | 11 | 33i | 29 | 15 | iii | 0 | 0 |
| c | 29 | 30 | c | 0 | 6 | ii | 1 | 11 | iv | 0 | 2 |
| d | 0 | 0 | d | 25 | 12 | iii | 0 | 2 | v | 0 | 4 |
| 11a | 0 | 0 | 23a | 0 | 3 | iv | 0 | 2 | 43i | 30 | 19 |
| b | 0 | 1 | b | 0 | 5 | v | 0 | 0 | ii | 0 | 0 |
| c | 11 | 13 | c | 3 | 0 | 34i | 15 | 1 | iii | 0 | 0 |
| d | 19 | 18 | d | 27 | 23 | ii | 7 | 8 | iv | 0 | 7 |
| 12a | 0 | 2 | 24a | 0 | 13 | iii | 8 | 20 | v | 0 | 4 |
| b | 0 | 0 | b | 30 | 17 | iv | 0 | 0 | 44i | 30 | 22 |
| c | 30 | 24 | c | 0 | 1 | v | 0 | 1 | ii | 0 | 0 |
| d | 0 | 4 | d | 0 | 0 | | | | iii | 0 | 0 |
| | | | | | | | | | iv | 0 | 4 |
| | | | | | | | | | v | 0 | 4 |

Legend: a - response a i - correct response
b - response b ii - error in verb
c - response c iii - omission of one or more transformations
d - response d iv - wrong transformation v - other error

In Subtest D, items 21 and 22 were the best discriminators with 27 and 25 correct responses respectively by the high ability level group in comparison with 18 and 12 by the low ability level group.

In Subtest E, only Item 24 was a good discriminator. All 30 members of the high ability level group responded to response b, but only 17 of the low ability level group chose this correct response.

In Subtest F, items 31, 32, 33 and 34 were all good discriminators with the following responses for the high and low ability level groups respectively: 22:7; 20:7; 29:15 and 15:1.

In Subtest G, items 38 and 39 were the best discriminators with the following responses for the high and low ability level groups respectively: 25:9 and 24:6.

No item in Subtest H proved to be successful as a discriminator.

The best items, therefore, on the Transformational Grammar Test for discrimination between the high ability level group and the low ability level group were the following: 2, 4, 7, 14, 15, 21, 22, 24, 31, 32, 33, 34, 38 and 39. Consequently, these items could probably be used as the basis for a short test possessing considerable discriminatory power between high and low ability level students, because the high ability level students recorded 421 correct responses and only 82 incorrect responses on these items, whereas the low ability level students recorded only 225 correct responses but 279 incorrect responses. A chi square test for the difference between the proportions yielded a value for chi square of 18.22 which is significant at the 0.05 level.

It should be noted that Subtest B is represented by only one item, Item 7, and this item is undoubtedly the weakest of the 14 items selected, and Subtest H is unrepresented. These two subtests were shown in Table XXII to be the two easiest subtests for all students irrespective of grade level or ability level. Subtest F, shown in Table XXII to be the most difficult of the subtests for all students, again irrespective of grade level or ability level, also provides four of the best items for discrimination between the two groups.

Difficulties

The difficulties experienced by the students in making responses appear to fall into three classes:

1. difficulties with the analogy;
2. difficulties with the transformation; and
3. difficulties with the kernel.

Difficulties with the analogy. The fifteen incorrect responses to answer 2b and the fourteen to answer 4b were undoubtedly the result of failure to control the analogy since it is very unlikely that any high school student can imagine that codfish is a transform of "a fish to cod" or that handyman is a transform of "the handy is a man". It seems almost certain that the real difficulty was with the analogy rather than with the grammar, that is with the form of the item rather than with the content of the item.

This kind of difficulty was also experienced more by the low ability students than the high ability students. For example, the high ability students gave only one response each to these same two answers. The use of analogies in the construction of items may then

have been a greater handicap to the low ability students than to the high ability students in certain items.

Difficulties with the transformation. The difficulties with manipulating the transformations involved were much more frequent than any other difficulties. They fell into two groups: difficulties with control of the tense or the auxiliary verb, and difficulties with the number of transformations involved.

Tense and auxiliary verb difficulties were revealed on both kinds of items, recognition and production. In Item 11 has been prepared was chosen almost as often as was prepared by the high and low ability level groups alike (11 and 13 times respectively). In Item 15 the high ability level group chose Isn't 14 times and the correct Wasn't only 15 times; the low group preferred Isn't 25 times to 4 responses for Wasn't. Item 22 also showed the same tendency for students to choose an incorrect tense or auxiliary verb. That these difficulties with the tenses and auxiliary verbs were not entirely due to the analogical form of the item construction was obvious from the large number of correct responses in other items. The production items, 28, 29 and 30, also revealed little difficulty with the analogical form, but items 31, 32, 33 and 34 revealed frequent mistakes, particularly among the low ability level group with the tenses and the auxiliary verbs. In the latter case the mistake was quite often in the repetition of the tense or auxiliary verb of the example, e. g. in Item 32 Was the lion chased by the hunter? was given as the response instead of Will the lion be chased by the hunter? This kind of mistake illustrates the difficulty these students experienced with both the transformation and the analogy.

Items 31 and 34 revealed the second kind of error mentioned above, difficulties with the number of transformations involved. Item 31 required the use of both T_{Passive} and T_{Not} . In thirteen instances the low ability level students were unable to give the correct response. Typical responses involved the omission of the T_{Passive} as in The Students will not write the test or the omission of the T_{Not} as in The test will be written by the students. Item 34 required the use of T_{Passive} , T_{Not} and T_{Question} . Again the mistakes were almost entirely mistakes in the omission of one or two of the transformations.

This difficulty with the manipulation of the T_{Passive} and T_{Not} transformations and their combinations has also been noted in related experiments by other investigators. For example, Miller found that students required more time to manipulate passive than negative transformations and still more time for passive-negatives.² In a further related investigation, Tannenbaum, Evans and Williams singled out the passive transformation as the greatest cause of difficulty in manipulating kernel sentences and the passive and negative transformations. They hypothesized that the relative infrequency of this structure together with the way its use is discouraged might have some effect on its availability and, therefore, that "other factors than the characteristics of the language code must be considered in the study of language behavior."³ Certainly the T_{Passive} transformation

²G. A. Miller, "Some Psychological Studies of Grammar," American Psychologist, XVII (November, 1962), p.759.

³P. H. Tannenbaum, R. R. Evans and Frederick Williams, "An Experiment in the Generation of Simple Sentence Structures," The Journal of Communication, XIV:2 (June, 1964), p.117.

proved to be a source of difficulty for many students in this investigation.

Items 38 and 39 revealed difficulties the low ability level students experienced with making the correct nominalization transformation from two kernels. Item 38 was frequently rendered as John's painting the garage carefully was praiseworthy and Item 39 as The driver's cleverness to avoid the accident pleased the crowd. Altogether the low ability students gave 15 incorrect responses of this kind in item 38 and 23 in Item 39 as opposed to 2 and 5 respectively of the same kind by the high ability level students.

Difficulties with the kernel. The third kind of error, difficulties with recognizing the proper kernel, was fairly infrequent. However, one item, Item 24, showed a clear differentiation between the high and low ability level students in this regard. Item 24 required the reduction of the sentence The record which Sally asked for wasn't in stock last week into The record wasn't in stock last week and Sally asked for the record. However, only 17 of the low ability level group were able to do this as opposed to all 30 of the high ability level group. Thirteen of the low ability level group chose instead the kernels The record wasn't in stock and She asked for the record last week, thus showing the difficulty they experienced in recognizing the correct kernels for the matrix and constituent sentences.

IV. SUMMARY AND CONCLUSIONS

All students, regardless of grade or ability level, found subtests B, E and H the easiest subtests and subtests C and F the most difficult subtests. At the senior high school level fourteen of the test items (2, 4, 7, 14, 15, 21, 22, 24, 31, 32, 33, 34, 38 and 39)

appeared to differentiate significantly between the high and low ability level groups. The senior high school students also experienced three general kinds of difficulties in responding to the items on the Transformational Grammar Test: difficulties with the analogy; difficulties with the transformation; and difficulties with the kernel. There was, also, a greater incidence of such difficulties in the low ability level group than in the high ability level group.

The fifth hypothesis with which the investigation was concerned was that the responses of the students to the various items would provide some additional insight into our understanding of transformational grammar. The responses of the students do add a little to this understanding. First of all, low ability level students are not as competent as high ability level students in manipulating the grammar, and a test based on selected items from the grammar could actually be used to discriminate between the two ability groups. Thus, there appears to be an important differential control over conscious manipulation of the processes in the grammar between the senior high school students who were designated high ability students and those designated low ability students. This differential control also appears to be fairly independent of the use of analogy in these items.

The responses also suggested that the ordering of transformations within the existing grammatical sketches is probably but poorly related to the ordering of difficulties experienced by students. There was some evidence that, for all students, the manipulation of the T_{Passive} and T_{Not} transformations with single kernels was more difficult than the manipulation of two-base transformations. Recently, there has been some consideration given to alternative models of

transformational grammar, i. e. as to the ordering of the various types of rules.⁴ The findings of this investigation tend to support the need for such an exploration of possible alternatives.

The findings of this investigation also confirm the findings of other investigators that the T_{Passive} transformation creates difficulties which might not have been expected and indicate some support for the hypothesis of Tannenbaum, Evans and Williams that these difficulties arise from infrequent use and deliberate inhibition, i. e. the total language situation, rather than from a weakness in the explanatory power of transformational theory.⁵

Finally, the particular difficulties with the auxiliaries, passives and negatives are interesting. These difficulties appeared frequently on the Transformational Grammar Test; they also appear frequently in student writing, e. g. in tense sequence problems. It is interesting that in this way the Transformational Grammar Test did provide some confirmation of one's empirical knowledge of students' difficulties in writing.

⁴W. O. Dingwall, "Transformational Grammar: Form and Theory: A Contribution to the History of Linguistics," Lingua, XII (1963), pp. 266-268.

⁵Tannenbaum, Evans and Williams, loc. cit.

CHAPTER VII

SUMMARY, CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

I. SUMMARY OF MAIN FINDINGS

A Transformational Grammar Test was constructed in order to investigate how well high school students performed on such a test, how their performances on the test related to their performances on a Traditional Grammar Test, an Analogies Test and an Essay Test, and how the performances on the different tests, and subtests of the Transformational Grammar Test, varied with grade and ability level. All the tests were given to 120 senior high school students in grades X, XI and XII selected to fill groups matched by grade and ability level; in addition, the Transformational Grammar Test was given to forty grade VIII students selected to match the grade X students and similarly grouped.

The main findings of the investigation may be summarized as follows:

1. The Transformational Grammar Test produced a slightly negatively skewed distribution of total scores with a mean score of 33.84 and a standard deviation of 6.44 for the 120 senior high school students who were tested. The Essay Test produced a slightly positively skewed distribution of total scores and the Traditional Grammar Test and the Analogies Test produced normal distributions of total scores for the same students.
2. For the 120 senior high school students, all the Pearson product-moment r coefficients of correlation among the four

tests were positive and significant from zero and fell within the range of 0.51 to 0.58. They were, therefore, all fairly low like those reported in the literature, and of little use for individual prediction.

3. For the 120 senior high school students grouped by grade level, seventeen of the eighteen correlations among the tests were positive and significant from zero, whereas for the same students grouped by ability level only five of the eighteen correlations were positive and significant from zero.
4. The regression line for predicting the Essay Test scores from the Transformational Grammar Test scores was significantly non-linear for the senior high school students. The eta coefficient (correlation ratio) was 0.64 compared with the r coefficient of 0.54. The correlation coefficient between scores on the Essay Test and scores on the Transformational Grammar Test was not, however, significantly higher than the correlation coefficient between scores on the Essay Test and scores on the Traditional Grammar Test.
5. The Traditional Grammar Test, the Analogies Test and the Essay Test differentiated among senior high school students by both grade and ability level.
6. The Transformational Grammar Test and its subtests differentiated among students in both junior and senior high school by ability level.
7. The Transformational Grammar Test did not differentiate among senior high school students by grade level nor did seven of the eight subtests.

8. When junior high school students in grade VIII were included in the population, the Transformational Grammar Test did differentiate among students by grade level in the overall secondary school population. It also differentiated between students in grade VIII and those in grade X by grade level, as did six of the eight subtests.
9. For all tests and for the subtests of the Transformational Grammar Test, there were significant interaction effects, which proved to have no overall pattern, indicating that there was no evidence that any particular group arranged by grade and ability level was necessarily superior or inferior to any neighboring group in the overall design of groups.
10. All students, regardless of grouping by grade or ability level, found subtests B, E and H to be the easiest of the subtests of the Transformational Grammar Test and subtests C and F the most difficult.
11. A comparison of the responses made to items on the Transformational Grammar Test by the high and low ability level senior high school students showed that fourteen test items (2, 4, 7, 14, 15, 21, 22, 24, 31, 32, 33, 34, 38 and 39) discriminated significantly between the two ability levels.
12. On the Transformational Grammar Test the senior high school students, particularly the low ability level students, experienced difficulties with making the correct analogy, with manipulating the auxiliary verb system in the transformation, with manipulating several transformations at once, with producing the correct nominalization transformation from two kernels, and with recognizing the correct kernels of a

complex sentence.

II. CONCLUSIONS AND IMPLICATIONS

The findings confirm the first hypothesis underlying the investigation that the various tests used would correlate positively with each other. However, it can be concluded from the generally low correlations that the tests measure very little in common and that they do not duplicate each other's function. The Transformational Grammar Test measures some of the same abilities that the Essay Test measures just as it measures some of the same abilities that the Traditional Grammar Test and Analogies Test measure. The low correlations between it and each of the other three tests, however, suggest that it measures much that the other tests do not measure. If it can be assumed that the Transformational Grammar Test does measure abilities related to the conscious manipulation of processes suggested by transformational grammar, then it may also be assumed that these abilities are therefore partially related to such abilities as the ability to write essays, the ability to analogize, and the ability to manipulate the metalinguistic processes required by traditional grammar. Furthermore, the facts that all the correlations are close to each other (0.51 to 0.58), all are fairly low, and no correlation is significantly different from any other would suggest that the Transformational Grammar Test is not an Analogies Test, or at least no more so than is either of the other tests.

The exclusive use of the analogical principle in the construction of the items of the Transformational Grammar Test undoubtedly imposes certain limitations on the effectiveness of the test. Though the use of the analogical principle does give the test

an internal consistency and helps to establish a set pattern of responding throughout, certain of the answers indicate that the making of the analogy creates problems. The implication of these findings is that a better test would probably not depend exclusively on the use of the analogical principle and the resultant variety of responses, particularly from a series of less rigidly structured items, would even further strengthen the test. It is conceivable too that such a test might produce differentiations which the present test does not produce.

The second hypothesis underlying the investigation was that the Transformational Grammar Test scores would actually predict the Essay Test scores better than would the Traditional Grammar Test scores. The findings did not confirm this hypothesis. Just as traditional grammar tests and tests of structural relations have in the past failed to reveal any close relationship between grammatical and composition ability, so the findings of this investigation, using a test constructed on principles of transformational grammar, fail to demonstrate a close relationship between the abilities. Moreover, they fail to demonstrate a significantly closer relationship between scores on a test of transformational grammar and composition scores than between scores on a test of traditional grammar and composition scores.

In view of the fact that none of the students in the experimental population had been taught any other grammar than traditional grammar, the inability of the Transformational Grammar Test to demonstrate a significantly better connection between grammatical ability and composition ability than does the Traditional Grammar Test is not surprising. The investigation was deliberately designed so

that every advantage would accrue to the Traditional Grammar Test rather than to the Transformational Grammar Test in an attempt to establish significance even in such an unpromising situation. Although a significant superiority in prediction was not achieved for the Transformational Grammar Test in these circumstances, some superiority was found as evidenced by the higher correlation coefficient between the Transformational Grammar Test and the Essay Test than between the Traditional Grammar Test and the Essay Test.

Underlying the hypothesis, of course, is the assumption that there is actually some value in students' being able to manipulate the language consciously. The investigation does make an important contribution towards assessing students' ability to manipulate consciously the language itself rather than the metalanguage, i. e. the terminology with which the language is discussed. Such conscious manipulation of the language is measurable mainly by the use of grammar tests. The Transformational Grammar Test was deliberately devised so that the metalanguage problem would be minimized by the elimination of all terminology, except sentence, and the use of the analogical principle in the construction of items. The findings show that the relationship between such a grammar test and a writing test is neither better nor worse than the relationship of a test of traditional grammar, replete with terminology, and the writing test. If a student's ability to manipulate language consciously is to be tested, one implication of the results of this investigation is that better methods of testing can be developed, methods which actually test manipulation of the language rather than manipulation of the metalanguage.

The third and fourth hypotheses were concerned with the ability of the tests used, particularly the Transformational Grammar Test, to differentiate among students by grade and ability level. The Traditional Grammar Test, the Analogies Test and the Essay Test all differentiate by both grade and ability level. It may be concluded that the abilities they measure vary both by chronological age or exposure to teaching and by ability level.

On the other hand, the abilities measured by the Transformational Grammar Test do not appear to increase significantly within the senior high school grades; however, there are significant differences in these abilities in the same grades when students are grouped by ability level rather than by grade level. When junior high school students are included, most of the abilities do appear to increase between the junior and senior high school and even between grades VIII and X.

In view of the increase between grade VIII and X, it would seem that the junior high school years might be the most fruitful years for the teaching of grammar, regardless of the purpose of that teaching. The Transformational Grammar Test shows that there are significant increases in the abilities measured by the test, and the answers to some of the subtests, e. g. Subtest B, suggest that grade VIII students possess considerable grammatical sophistication. One can only regret that a student capable of making the distinction between kind salesman and fruit salesman in grade VIII should so often be taught in that grade and later grades that there is no grammatical distinction.

All the tests reveal the important differences in the

performances of the three ability level groups, particularly the marked difference between the high and low ability levels. On the Transformational Grammar Test the high ability level students showed that they could consciously manipulate the grammar of English very successfully, much more successfully than the low ability level students. In fact the distributions of the scores of the two groups hardly overlapped at any time on any test. This fact would seem to indicate that if conscious manipulation of the grammar of English is deemed to be a worthy goal in English teaching, then not all students will have the same problems. In general, students low in intelligence and low in academic achievement will experience considerable difficulty in such conscious manipulation, whereas students high in intelligence and high in academic achievement will experience little difficulty. The implication appears to be that ability grouping, whether within a class or within a grade, might well be necessary for the most effective and efficient teaching performance.

The item analysis of the papers of the high and low ability level students also reveals the particular deficiencies of the low ability level students. They fail at times to recognize kernels, they fail to respond correctly to the tense marker or the auxiliary verb system in the kernel, they find difficulty in manipulating more than one transformation at a time, and they tend to write down answers which are obviously unacceptable. Such findings imply that it is just these things which should be practised extensively by low ability students in the hope that such practice would bring the performance of these students closer to that of the high ability students. Work on recognition of correct responses should also probably precede work

on the production of correct responses. If, as is suggested by the literature, intelligent behavior is closely connected with verbal facility, such practice might result not only in greater facility with the language but also in more intelligent behavior, as gauged by currently used intelligence tests.

There is also some reason to believe that the kinds of exercises suggested by the theory underlying transformational grammar might be more successful in increasing language development and language power than the kinds of exercises suggested by other theories of grammar. Although, as has been pointed out in the literature, the theory underlying transformational grammar is merely a hypothesis about the kind of sentence-generating machinery a human being must possess, nevertheless it is an extremely attractive hypothesis. If, in fact, human beings do produce sentences in the precise way suggested by the theory, then it would seem wise to construct grammatical exercises according to the theory on the assumption that such exercises would gain thereby in usefulness.

The final hypothesis underlying the investigation was that the responses of the students to items on the Transformational Grammar Test would add something to our understanding of transformational theory itself. The fact that it is precisely with the control of more than one transformation that students, particularly the low ability level ones, have difficulty confirms what previous researchers have reported, that is that simple kernel sentences involving single transformations are more readily manipulated consciously by students than the same kernels and several transformations. Even complex sentences seem to be more easily manipulated than do simple sentences which require the use of two or three transformations,

particularly when the T_{Passive} transformation is one of these. The responses of students also indicate that they agree with the interpretation Lees gives for nominal compounds in Subtest A, with the underlying structural differences of the kernels in Subtest B, and so on. Consequently, the findings indicate some empirical support for the ordering of the simple transformation rules in transformational grammar, for recent concerns with the ordering of the various types of rules in the grammar, and for some of the transformational histories of particular items.

On the whole then, this investigation does not lead to any confirmation of the initial assumptions said to be widely held by many persons concerned with education. The findings do not demonstrate support for the first assumption that there is a very close connection between knowledge of the language and ability with the language, even when an estimate of that ability is made through a test constructed according to what may be the most insightful linguistic theory available. This is not to say that the assumption is invalid, but merely to say that the validity was not shown in this investigation. The second assumption of continuous development is also questioned at the senior high school level, for the findings suggest that grammatical ability of the kind measured by the Transformational Grammar Test might reach a plateau at the senior high school level and that level of performance might be more closely related to ability level than chronological age. This raises the problem of whether or not low ability students should be taught grammar in an attempt to raise the general level of their performance in language activities. The third assumption, then, is that the students would benefit from such teaching.

This study has no evidence which bears directly on this assumption, but the finding that even grade VIII students prefer to rely on their feelings about actual grammatical relationships rather than on the descriptions of traditional grammar with which they are familiar would suggest that any instruction in grammar should be based on a much more insightful theory than the theory of traditional grammar.

The fourth assumption, that everyone is agreed on what "grammar" is, i. e. it is traditional grammar, was shown to be quite false in the discussion of relevant literature, and the weaknesses and limitations of all tests, including the Transformational Grammar Test used in this investigation, must still leave suspect the fifth assumption that we can measure grammatical and composition ability validly and reliably.

III. SUGGESTIONS FOR FURTHER RESEARCH

Certain of the findings in the investigation suggest three possible investigations that might be conducted:

1. This investigation was not concerned with the teaching of transformational grammar but merely with its use in a test which avoids the use of grammatical terminology. Even though transformational grammar was not taught, the test scores produced a higher correlation, but not significantly so, with essay writing scores than did scores on a test of the traditional grammar which all the students had been taught. It should be possible to conduct an investigation in which, over a period of time, two groups of students were taught grammar, one traditional grammar and the other transformational grammar. The performances of these groups of students in

essay writing could then be compared with each other and with those of a control group not taught grammar at all. It might be hypothesized that a group of students taught a grammar which is sentence based, which is synthetic, and which is based on an insightful theory, i. e. transformational grammar, would show improvement in writing over each of the other two groups in such an experiment.

2. While this investigation was concerned with the problem of students' conscious manipulation of grammatical processes, processes which they had internalized and made subconscious, a further investigation is required of the relationship between this subconscious knowledge and the conscious knowledge in order to discover the feasibility of making conscious what is subconscious, the techniques which might best be employed, and the kinds of relationships which exist between a subconscious or intuitive knowledge, as shown by performance in oral and written discourse, and conscious knowledge, as shown by performance on tests of sentence analysis and synthesis. Existing studies have failed to demonstrate a really close relationship; what are required are studies which examine the relationship, which almost everyone assumes must exist, using the powerful grammatical insights suggested by transformational theory.
3. The investigation was not concerned with ordering grammatical processes according to any principles of simplicity and/or complexity, except within Subtest C and Subtest F where the grammatical model suggested an order of difficulty. In view

of the fact that all students found Subtest B and Subtest H generally quite easy and experienced most difficulty with Subtest C and Subtest F and that the grammatical processes in B and H are more complex, in a certain sense, than those in C and F, it would appear that a further investigation is required of the systems of ordering within the grammar and of the concept of complexity. Are processes which are more complex in the grammar, i. e. transformations which must follow others rather than precede for the sake of "simplicity" or "economy" or processes involving two kernels rather than one, thereby more difficult to master and manipulate? And further, what are the connections between the ordering of the processes in the transformational grammar and the ordering of the learning of grammar by children?

This investigation was a tentative first approach to the whole problem of using transformational grammar in investigations of grammatical ability and language development. It was deliberately and necessarily limited by using the grammar in a narrow way and by using a fairly small but rigidly structured experimental population. In spite of these limitations the investigation did produce certain significant findings. As a result, further investigations, such as those suggested above, perhaps need be less limited both in the choice of an experimental population and in the employment of the grammatical theory.

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APPENDICES

APPENDIX A

TRANSFORMATIONAL GRAMMAR TEST

Name _____

Grade _____

Total _____

SUBTEST A

Here are two English sentences with certain words underlined:

The hounddog is here.

The dog is a hound.

Now one or more of the four compounds which follow can be rewritten in exactly the same way as hounddog was rewritten in the above example. UNDERLINE THE COMPOUND OR COMPOUNDS WHICH CAN BE REWRITTEN IN EXACTLY THE SAME WAY.

a) ape-man

c) pine tree

b) draw-string

d) pushbutton

You should have underlined a) ape-man and c) pine tree since it is possible to rewrite ape-man as "The man is an ape" and pine tree as "The tree is a pine". However, since it is not possible to rewrite draw-string as "The string is a draw" and pushbutton as "The button is a push", you should NOT have underlined them.

NOW DO EXACTLY THE SAME THING IN EACH OF THE NEXT SIX QUESTIONS.

IN EACH QUESTION UNDERLINE THE COMPOUND OR COMPOUNDS WHICH CAN BE REWRITTEN IN THE SAME WAY AS THE COMPOUND IN THE EXAMPLE SENTENCES IS REWRITTEN. THERE MAY BE EITHER ONE, TWO OR THREE COMPOUNDS TO BE UNDERLINED IN EACH QUESTION.

1. Example sentences:

Your girlfriend is here.

The friend is a girl.

a) textbook

c) servant girl

b) flashlight

d) stopwatch

2. Example sentences:

The pull chain is here.

It's a chain to pull.

a) foodstuff

c) flashcard

b) codfish

d) flashlight

3. Example sentences:

The madman is here.

The man is mad.

a) darkroom

c) blackboard

b) highchair

d) bottleneck

4. Example sentences:

The apple core is here.

The apple has a core.

a) placename

c) highway

b) handyman

d) bedside

5. Example sentences:

The fishpond is here.

The pond is for a fish.

a) frog man

c) rock candy

b) gopher hole

d) piggybank

6. Example sentences:

The dragonfly is here.

The fly is like a dragon.

a) kettledrum

c) tissue paper

b) pigpen

d) cough drop

Total A _____

SUBTEST B

Here is an English sentence:

John sings in the bath.

Now one or more of the four sentences which follow have the same grammatical structure as the sentence given above. UNDERLINE THE SENTENCE OR SENTENCES WHICH HAVE THE SAME GRAMMATICAL STRUCTURE.

- a) John sings a song.
- b) John sings in the choir.
- c) John sings at school.
- d) John sings folksongs.

You should have underlined b) John sings in the choir and c) John sings at school since they have the same grammatical structure as John sings in the bath. The other two sentences have a different grammatical structure so they should NOT have been underlined.

NOW DO EXACTLY THE SAME THING IN EACH OF THE NEXT FOUR QUESTIONS.

IN EACH QUESTION UNDERLINE THE SENTENCE OR SENTENCES WHICH HAVE THE SAME GRAMMATICAL STRUCTURE AS THE EXAMPLE SENTENCE. YOU MAY HAVE TO UNDERLINE ONE, TWO OR THREE SENTENCES.

7. Example sentence:

The detective looked eagerly.

- a) The detective looked homely.
- b) The detective looked anxiously.
- c) The detective looked friendly.
- d) The detective looked closely.

8. Example sentence:

The detective looked fierce.

- a) The detective looked carefully.
- b) The detective looked ferocious.
- c) The detective looked thoroughly.
- d) The detective looked ugly.

9. Example sentence:

He is a tire salesman.

- a) He is a piano salesman.
- b) He is a kind salesman.
- c) He is a fruit salesman.
- d) He is a brush salesman.

10. Example sentence:

He is a nice salesman.

- a) He is a truck salesman.
- b) He is an excellent salesman.
- c) He is a good salesman.
- d) He is a bible salesman.

SUBTEST C

Here are two English sentences which are related grammatically to each other in a certain way:

John kicked Jim. Jim was kicked by John.

NOW UNDERLINE THE SENTENCE WHICH IS RELATED TO THE PROBLEM SENTENCE IN THE SAME WAY AS THE EXAMPLE SENTENCES ARE RELATED.

Problem sentence:

Mary is helping Peter.

- a) Mary is being helped by Peter.
- b) Peter is being helped by Mary.
- c) Peter was helped by Mary.
- d) Peter is helping Mary.

The sentence you should have underlined is b) Peter is being helped by Mary since it is related to the problem sentence Mary is helping Peter in exactly the same way as Jim was kicked by John is related to John kicked Jim.

NOW DO EXACTLY THE SAME THING IN EACH OF THE NEXT SEVEN QUESTIONS. IN EACH QUESTION UNDERLINE THE SENTENCE WHICH IS RELATED TO THE PROBLEM SENTENCE IN THE SAME WAY AS THE EXAMPLE SENTENCES ARE RELATED. UNDERLINE ONLY ONE ANSWER IN EACH QUESTION.

11. Example sentences:

The man has repaired the pipe. The pipe has been repaired by the man.

Problem sentence:

The guest speaker prepared a long speech.

- a) A long speech will be prepared for the guest speaker.
- b) A long speech will be prepared by the guest speaker.
- c) A long speech has been prepared by the guest speaker.
- d) A long speech was prepared by the guest speaker.

12. Example sentences:

John is going home. John isn't going home.

Problem sentence:

John likes Mary.

- a) Mary likes John.
- b) John didn't like Mary.
- c) John doesn't like Mary.
- d) Mary doesn't like John.

13. Example sentences:

He is arriving at noon. Is he arriving at noon?

Problem sentence:

They will eat the plums.

- a) Will they eat the plums?
- b) May they eat the plums?
- c) They may eat the plums?
- d) Would they eat the plums?

14. Example sentences:

The boy took the book. The book wasn't taken by the boy.

Problem sentence:

The girls are going to do the work.

- a) The work wasn't going to be done by the girls.
- b) The girls aren't going to do the work.
- c) The work isn't going to be done by the girls.
- d) The work isn't going to hurt the girls.

15. Example Sentences:

The boy is reading the book. Isn't the book being read by the boy?

Problem sentence:

The men repaired the motor.

- a) Isn't the motor being repaired by the men?
- b) Weren't the men repairing the motor?
- c) The men didn't repair the motor?
- d) Wasn't the motor repaired by the men?

16. Example sentences:

The boy is going home. Isn't the boy going home?

Problem sentence:

The boys want to play ball.

- a) Do the boys want to play ball?
- b) Don't the boys want to play ball?
- c) The boys don't want to play ball?
- d) Are the boys wanting to play ball?

17. Example Sentences:

The boy took the book. Wasn't the book taken by the boy?

Problem sentence:

Peter could have read the story.

- a) Could the story have been read by Peter?
- b) Can't the story have been read by Peter?
- c) Couldn't Peter have the story read to him?
- d) Couldn't the story have been read by Peter?

Total C _____

SUBTEST D

Here are two English sentences:

The bird sang beautifully. The bird was in the tree.

These two sentences can be combined to make one sentence:

The bird in the tree sang beautifully.

Here are two more English sentences:

The man was by the fire. The man was in the corner.

NOW UNDERLINE THE SENTENCE BELOW WHICH COMBINES THESE TWO SENTENCES
IN THE SAME WAY AS THE TWO SENTENCES ABOVE WERE COMBINED.

- a) The man in the corner is by the fire.
- b) The man in the corner was by the fire.
- c) The man was in the corner by the fire.
- d) The corner man was by the fire.

You should have underlined b) The man in the corner was by the fire since this is the only sentence which combines The man was by the fire and The man was in the corner in exactly the same way as the two example sentences were combined.

NOW DO EXACTLY THE SAME THING IN EACH OF THE NEXT FIVE QUESTIONS.
IN EACH QUESTION UNDERLINE THE SENTENCE WHICH COMBINES THE TWO
SENTENCES IN THE SAME WAY AS THE EXAMPLE SENTENCES ARE COMBINED
FOR YOU. UNDERLINE ONLY ONE ANSWER IN EACH QUESTION.

18. Example sentences:

The book belongs to him. The book is on the desk.

The book on the desk belongs to him.

The boy gave his friend the mouse. The boy was in the story.

- a) The boy gave his friend in the story the mouse.
- b) In the story the boy gave his friend the mouse.
- c) The boy in the story is giving the mouse to his friend.
- d) The boy in the story gave his friend the mouse.

19. Example sentences:

The apple isn't ripe. He is eating the apple.

The apple which he is eating isn't ripe.

The story was quite true. The girl told the story.

- a) The story which the girl told was quite true.
- b) The story which the girl is telling is quite true.
- c) The girl told the story which was quite true.
- d) The girl's story was quite true.

20. Example sentences:

The fact surprised them. John works hard.

That John works hard surprised them.

The fact amuses me. He wants to come now.

- a) It amuses me that he wants to come now.
- b) That he amuses me makes me want him to come now.
- c) That he wanted to come now amused me.
- d) That he wants to come now amuses me.

21. Example sentences:

The fact is amazing. Bill knows science thoroughly.

Bill's thorough knowledge of science is amazing.

The fact was remarkable. John remembered the events perfectly.

- a) John's perfect memory of the events is remarkable.
- b) John's perfect memory of the events was remarkable.
- c) It was remarkable that John remembered the events perfectly.
- d) John remembered the remarkable events perfectly.

22. Example sentences:

The fact pleases me. John is wise not to drive fast.

John's wisdom in not driving fast pleases me.

The fact impressed them. Peter was careful to tell the story
correctly.

- a) Peter's impressiveness was in his care in telling the story.
- b) Peter's care in telling the story correctly impresses them.
- c) They were impressed by Peter's care in telling the story.
- d) Peter's care in telling the story correctly impressed them.

SUBTEST E

The sentence:

John is playing for a team in Vancouver.

can be rewritten as two sentences:

John is playing for a team. The team is in Vancouver.

NOW UNDERLINE THE ONE PAIR OF SENTENCES WHICH REWRITE THE
FOLLOWING SENTENCE IN EXACTLY THE SAME WAY.

The fire alarm is near the store on the corner.

- a) The store is near the fire alarm. The fire alarm is on
the corner.
- b) The fire alarm is near the store. The store is on the corner.
- c) The fire alarm is near. The store is on the corner.
- d) The fire alarm is near the corner. The store is on the corner.

You should have underlined this pair of sentences: b) The fire
alarm is near the store. The store is on the corner. since this

is the only pair of sentences which rewrite the problem sentence
in exactly the same way as the example sentences are rewritten.

NOW DO EXACTLY THE SAME THING IN EACH OF THE NEXT FIVE QUESTIONS.

IN EACH QUESTION UNDERLINE THE ONE PAIR OF SENTENCES WHICH REWRITE
THE PROBLEM SENTENCE IN THE SAME WAY AS THE EXAMPLE SENTENCE IS
REWRITTEN FOR YOU.

Total D _____

23. Example sentence:

The toy under the table is broken.

The toy is broken. The toy is under the table.

The tables in the room are covered with books.

- a) The tables are covered in the room. The tables are covered with books.
- b) Books cover the tables. The tables are in the room.
- c) The tables are covered. The book tables are in the room.
- d) The tables are covered with books. The tables are in the room.

24. Example sentences:

The book which she took out wasn't very interesting.

The book wasn't very interesting. She took out the book.

The record which Sally asked for wasn't in stock last week.

- a) The record wasn't in stock. Sally asked for the record last week.
- b) The record wasn't in stock last week. Sally asked for the record.
- c) The record was asked for last week. Sally asked for the record.
- d) The record was asked for. Sally asked for it last week.

25. Example sentence:

The center's fierce checking of the opposing team captain was praised.

It was praised. The center checked the opposing team captain fiercely.

Mary's poor acting of the part was criticized.

- a) Mary was a poor actress. She was criticized for it.
- b) It was Mary who acted. She acted the part poorly.
- c) She was criticized. She acted the part poorly.
- d) It was criticized. Mary acted the part poorly.

26. Example sentence:

Driving out in the country, we came across an old log cabin.

We came across an old log cabin. We were driving out in the country.

Walking home from the store, Jane saw a stray dog.

- a) Jane was walking. Jane saw a stray dog walking home from the store.
- b) Jane saw a stray dog walking home. Jane was walking from the store.
- c) Jane saw a stray dog. Jane was walking home from the store.
- d) Jane saw a stray dog walking from the store. Jane was walking home.

27. Example sentence:

Encouraged by the audience, he sang another song.

He sang another song. The audience encouraged him.

Blinded by the snowstorm, he was forced to stop.

- a) He was forced to stop by the snowstorm. He was blind.
- b) He was forced to stop. He was blinded by the snowstorm.
- c) The snowstorm forced him to stop. He was blinded.
- d) He was forced to stop. The snowstorm blinded him.

Total E _____

SUBTEST F

The sentence:

The dog chased the cat.

can be rewritten:

The cat was chased by the dog.

by making certain grammatical changes.

CHANGE THE FOLLOWING SENTENCE IN EXACTLY THE SAME WAY AS THE
EXAMPLE SENTENCE WAS CHANGED.

The man is chasing the lion.

.....

You should have written The lion is being chased by the man.

NOW CHANGE EACH SENTENCE IN THE NEXT SEVEN QUESTIONS IN EXACTLY
THE SAME WAY AS THE EXAMPLE SENTENCE IS CHANGED FOR YOU. WRITE
YOUR ANSWERS ON THE LINES PROVIDED.

28. Example sentence:

The boy was eating the cake.

The cake was being eaten by the boy.

The soldiers will shoot the spy.

.....

29. Example sentence:

Peter likes chocolate.

Peter doesn't like chocolate.

John can do it.

.....

30. Example sentence:

He likes apples.

Does he like apples?

He went to the movies.

.....

31. Example sentence:

The boy took the marbles.

The marbles weren't taken by the boy.

The students will write the test.

.....

32. Example sentence:

The dog ate the meat.

Was the meat eaten by the dog?

The hunter will chase the lion.

.....

33. Example sentence:

The girl is wearing a hat.

Isn't the girl wearing a hat?

The boy has read the book.

.....

34. Example sentence:

The driver collected the tickets.

Weren't the tickets collected by the driver?

The children are writing letters.

.....

Total F _____

SUBTEST G

The two sentences:

The boy is waiting for you at the door.

The boy is in the red car.

can be joined together like this:

The boy in the red car is waiting for you at the door.

NOW JOIN THESE TWO SENTENCES IN EXACTLY THE SAME WAY.

The man was at the front of the room.

The man was in the red leather chair.

.....

You should have written The man in the red leather chair was at the front of the room.

NOW DO EXACTLY THE SAME THING IN EACH OF THE NEXT FIVE QUESTIONS.

IN EACH QUESTION JOIN THE TWO SENTENCES TOGETHER IN THE SAME

WAY AS THE TWO EXAMPLE SENTENCES ARE JOINED FOR YOU.

35. Example sentences:

The executive arrived.

The executive is from Toronto.

The executive from Toronto arrived.

The team defeated all its opponents.

The team is from the large high school.

.....

36. Example sentences:

The books are missing.

You borrowed the books.

The books which you borrowed are missing.

The package arrived this morning.

You have been expecting the package.

.....

.....

37. Example sentences:

The fact annoyed them.

He wanted ten dollars.

That he wanted ten dollars annoyed them.

The fact pleased him no end.

The baby was healthy.

.....

.....

38. Example sentences:

The fact was unusual.

Peter asked a question quietly.

Peter's quiet asking of a question was unusual.

The fact was praiseworthy.

John painted the garage carefully.

.....

.....

39. Example sentences:

The fact made a good impression.

John was sensible to tell the truth.

John's sense in telling the truth made a good impression.

The fact pleased the crowd.

The driver was clever to avoid the accident.

.....

.....

SUBTEST H

The two sentences:

Fred stood in the doorway. Fred could see the room was empty.

can be joined to make one sentence:

Standing in the doorway, Fred could see the room was empty.

NOW JOIN THE FOLLOWING TWO SENTENCES IN EXACTLY THE SAME WAY.

Mary came down the path. Mary tripped over a broken stick.

.....

.....

You should have written Coming down the path, Mary tripped
over a broken stick.

NOW DO EXACTLY THE SAME THING IN EACH OF THE NEXT FIVE

QUESTIONS. IN EACH QUESTION JOIN TOGETHER THE TWO SENTENCES IN

EXACTLY THE SAME WAY AS THE EXAMPLE SENTENCES ARE JOINED FOR YOU.

40. Example sentences:

The man noticed the red light. The man slowed down.

Noticing the red light, the man slowed down.

The hunter left his tent. The hunter found himself face
to face with a large bear.

.....

.....

Total G _____

41. Example sentences:

The driver was completely tired out by his work. The driver
soon fell asleep.
Completely tired out by his work, the driver soon fell asleep.

The army was badly beaten in the battle. The army retreated
to the mountains.

.....
.....

42. Example sentences:

You do that properly. You will have to work night and day.

To do that properly, you will have to work night and day.

You speak Russian fluently. You really must live in Russia.

.....
.....

43. Example sentences:

The climbers were anxious to get going. The climbers packed
up their camp in a hurry.

Anxious to get going, the climbers packed up their camp in
a hurry.

The prisoners were afraid even to whisper. The prisoners
huddled together in a corner.

.....
.....

44. Example sentences:

You run away. You will only make matters worse.

By running away, you will only make matters worse.

The workman jumped to one side. The workman saved his life.

.....
.....

Total H _____

APPENDIX B

Barrett-Ryan-Schrammel English Test

NEW EDITION

by E. R. Barrett

Teresa M. Ryan

and H. E. Schrammel

Kansas State Teachers College, Emporia, Kansas

FORM **DM**

DIRECTIONS

Do not open this booklet until you are told to do so.

This is a test of your knowledge and use of English. There are five parts to this test. Each part has its own directions and sample questions which show you how to mark the answers on the answer sheet. You are to read the directions, study the sample, and then answer the questions. Do not spend too much time on any one question. Answer the easier items first and return to the others later.

For each question there are several possible answers. You are to decide which answer is the best one. Then, on the answer sheet, opposite the question number make a heavy black mark in the space which represents the answer you have chosen. In marking your answers always be sure that the answer space you mark corresponds to the question in the test booklet.

When you finish a page or a test, go on to the next page. When you finish the whole test, go back and check your answers. You will have exactly 60 minutes.

You will find that the answer sheet has spaces on both sides. When you have finished one side, be sure to turn the answer sheet over and answer the remaining questions on the other side.

Wait until you are told to begin.

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BRSET:NEW ED.:DM-9

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TEST 1. Functional Grammar

DIRECTIONS: In each *odd-numbered* sentence below there are two or more numbered words in heavy type. Decide which of these words is correct. Notice its number, and make a heavy black mark in the answer space with the same number as the word you have chosen.

Then in the sentence following choose the reason why the word is correct. Notice the letter before the reason and make a black mark in the answer space below that letter. The following samples are answered correctly:

45. The box of eggs ¹ **was** ² **were** crushed. 45

| | | |
|-------------------------------------|-------------------------------------|--------------------------|
| 1 | 2 | 3 |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| a | b | c |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
46. The form to be used should be: 46

| | | |
|--------------------------|-------------------------------------|--------------------------|
| a | b | c |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
- a. "were" to agree with the subject, "eggs."
b. "was" to agree with the subject, "box."
c. "were" to agree with "eggs," which is nearer the verb.

In question 45 in the sample "was" is the right answer. This is answer 1, and so the answer space under 1 has been filled in for question 45.

"Was" is correct because it must agree with the subject, which is "box." This is reason *b* in question 46, and so a mark has been made in the space under *b*.

On your answer sheet mark the answers for the test questions in a similar manner.

1. The principal announced that Jane and ¹ **I** ² **myself** ³ **me** ranked high in the contest.
2. The form to be used should be:
a. objective case, object of "announced."
b. nominative case, subject of "ranked."
c. reflexive pronoun used after "and."
3. He said ¹ **we** ² **us** girls might win prizes.
4. The form to be used should be:
a. "we," predicate nominative (subjective complement).
b. "us," object of "said."
c. "we," subject of "might win."
5. Everyone but Henry and ¹ **I** ² **me** ³ **myself** attended the game last night.
6. The form to be used should be:
a. objective case, object of "but."
b. nominative case, subject of "attended."
c. reflexive form after "and."
7. We did not see the book ¹ **lying** ² **laying** on the table.
8. The form to be used should be:
a. "laying," referring to an inanimate object.
b. "lying," participle of verb, no receiver of action.
c. "laying," participle of verb, receiver of action.
9. It could not have been ¹ **they** ² **them** whom we met on the street.
10. The form to be used should be:
a. object of "could have been."
b. object of "met."
c. predicate nominative with "could have been."
11. They asked ¹ **who** ² **whom** we thought the man was.
12. The form to be used should be:
a. "whom," object of "thought."
b. "whom," object of "asked."
c. "who," predicate nominative.
13. We had not the slightest idea as to ¹ **who** ² **whom** was speaking.
14. The form to be used should be:
a. "whom," object of verb.
b. "whom," object of "to."
c. "who," subject of verb.
15. Every one of the boys in the class had ¹ **their** ² **his** lessons well prepared.
16. The form to be used should be:
a. singular, referring to "every one."
b. plural, referring to "every one."
c. plural, referring to "boys."
17. The tones sounded ¹ **harsh** ² **harshly** to us.
18. The form to be used should be:
a. adjective, modifying "to us."
b. adverb, modifying "sounded."
c. adjective in predicate.
19. Father said he would ¹ **sure** ² **surely** be home early.
20. The form to be used should be:
a. adjective in predicate.
b. adverb, modifying verb.
c. part of verb.
21. The price was ¹ **considerable** ² **considerably** more than I had expected it to be.
22. The form to be used should be:
a. adjective in predicate.
b. adverb, modifying "more."
c. adverb, modifying the verb.
23. Football games are of great interest to me, who ¹ **am** ² **is** ³ **are** in college for my first year.
24. The form to be used should be:
a. first person, to agree with "who."
b. third person, to agree with "who."
c. plural number, to agree with "who."

TEST 1. Functional Grammar (Continued)

25. He said that it had ¹ laid ² lain there all day.
26. The form to be used should be:
 a. "laid," since the subject is inanimate.
 b. "lain," since the subject is a person.
 c. "lain," participle of verb, no receiver of action.
27. Only one of the houses which ¹ is ² are for sale is on State Street.
28. The form to be used should be:
 a. "is," to agree with "one."
 b. "are," to agree with "which."
 c. "is," to agree with "sale."
29. This board feels ¹ smoothly ² smooth as I run my hand over it.
30. The form to be used should be:
 a. object of "feels."
 b. adverb, modifying "feels."
 c. adjective in predicate.
31. Agnes is one student who ¹ study ² studies for other reasons than for good grades.
32. The form to be used should be:
 a. singular, to agree with subject, "student."
 b. plural, to agree with "who."
 c. singular, to agree with "who."
33. Joe's personality more than his achievements ¹ gain ² gains for him his popularity.
34. The form to be used should be:
 a. singular, after "more than."
 b. singular, to agree with "personality."
 c. plural, to agree with "achievements."
35. The Scout leader, together with the boys, ¹ spend ² spends a week in camp.
36. The form to be used should be:
 a. plural, to agree with compound subject.
 b. plural, to agree with "boys."
 c. singular, to agree with "leader."
37. From each one of them ¹ come ² comes many a request for an extra week at camp.
38. The form to be used should be:
 a. singular, to agree with "each one."
 b. plural, to agree with "many a request."
 c. singular, to agree with "many a request."
39. Neither the boys nor their leader ¹ fails ² fail to enjoy the outing.
40. The form to be used should be:
 a. plural, to agree with "boys."
 b. singular, to agree with "leader."
 c. plural, to agree with compound subject.
41. He said that either John or I ¹ am ² is ³ are to be awarded the prize.
42. The form to be used should be:
 a. plural, to agree with subject.
 b. first person singular, to agree with "I."
 c. third person singular after "either — or."
43. Henry would ¹ of ² have come if he had been in the city.
44. The form to be used should be:
 a. "of," to complete "would."
 b. "have," object of verb.
 c. "have," with past participle.

TEST 2. The Sentence

Section A: Parts of Speech

DIRECTIONS: In this test certain words or groups of words in each sentence have small numbers above them. You are to decide what part of speech each of the numbered words or groups of words is. Then look in the box marked "List of Answers," find the part of speech, and notice its number. For each numbered word make a mark in the answer space that is numbered the same as the part of speech.

Sample: An ⁵⁰ old ⁵¹ book ⁵² lies on the table.

50 ¹ ³ ⁴ ⁶ ⁸
 :: :: **■** :: ::

"Old," word number 50, is an adjective. Since "adjective" is number 4 in the List of Answers, a heavy mark has been made under 4 in the row of spaces for question 50. Fill in the answer for each numbered word or group of words in the same manner on your answer sheet.

List of Answers

- | | |
|---|--------------|
| 1 | noun |
| 2 | pronoun |
| 3 | verb |
| 4 | adjective |
| 5 | adverb |
| 6 | preposition |
| 7 | conjunction |
| 8 | interjection |

¹ ² ³
It ¹ seemed ² good to me to be ³ here.

⁴ ⁵ ⁶
Since the boys were all ⁴ ready to go, they ⁵ left ⁶ at once.

⁷ ⁸ ⁹
I was ⁷ really ⁸ happy to hear of his ⁹ success.

¹⁰ ¹¹ ¹²
He gave me his pencil, ¹⁰ for I ¹¹ had ¹² broken mine.

¹³ ¹⁴ ¹⁵
John spoke to ¹³ everyone ¹⁴ whom he met ¹⁵ on the street.

TEST 2. The Sentence (Continued)

Section B: Parts of a Sentence

DIRECTIONS: Each sentence below contains some words or groups of words which have numbers above them. In the box beside each group of sentences is a list of several grammatical uses of words in a sentence.

Read each sentence and for each numbered word or group of words find in the list its use in the sentence. Note the number of the answer and make a mark in the corresponding answer space.

Sample: An old ⁵³book ⁵⁴lies ⁵⁵on the ⁵⁶table.

| | 1 | 3 | 4 | 5 | 7 |
|----|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 53 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

"Book," word number 53, is used as the subject of a verb. Because "subject of verb" is number 1 in the List of Answers, a heavy mark has been made under 1 in the row of spaces for question 53.

In the same way fill in on your answer sheet the answer for each numbered word or group of words.

List of Answers

- | | |
|---|--|
| 1 | subject of verb |
| 2 | direct object of verb |
| 3 | object of preposition |
| 4 | indirect object of verb |
| 5 | predicate verb |
| 6 | predicate adjective (subjective complement) |
| 7 | predicate noun (subjective complement) |

John is the ¹⁶debater ¹⁷who won the debate for ¹⁸us.

The coach gave ¹⁹him a beautiful ²⁰book in recognition of what he ²¹had done.

Into the room came the ²²man ²³we had met on the ²⁴train.

At the concert we heard ²⁵singing ²⁶that was ²⁷beautiful.

There was much ²⁸argument as to ²⁹who ³⁰should be elected class president.

Sample: The man ⁵⁶in the car ⁵⁷called to us ⁵⁸as we passed.

| | 1 | 2 | 3 | 4 | 5 |
|----|--------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| 56 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 57 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

The group of words ⁵⁶in the car is a prepositional phrase. Since "prepositional phrase" is number 3 in the List of Answers, a heavy mark has been made under 3 in the row of spaces for question 56. The group of words ⁵⁷as we passed is a dependent clause. "Dependent clause" is number 2 in the List of Answers; hence a mark is made under 2 in the row for question 57. Fill in the answer for each numbered group in the same manner.

List of Answers

- | | |
|---|----------------------|
| 1 | independent clause |
| 2 | dependent clause |
| 3 | prepositional phrase |
| 4 | infinitive phrase |
| 5 | participial phrase |

One of the ³¹books ³²which are on the table was written by ³³Charles Dickens.

Although it is an old book, it is a ³⁴most interesting one. ³⁵Will you read it?

The speaker, ³⁷having bowed to the chairman, ³⁸who had introduced him, walked ³⁹to the front of the stage.

⁴⁰Before many minutes had passed, ⁴¹everyone was eagerly listening; ⁴²he was an interesting speaker.

Everyone said ⁴³that he was good; but, ⁴⁴for some reason, he was never asked ⁴⁵to return to our town.

: , ? ; NP
 :: :: :: :: ::
 :: :: :: :: ::

Go on to the next page.

TEST 4. Vocabulary

DIRECTIONS: In each sentence in this test there is one word in heavier type. After each sentence there are four numbered words. Decide which numbered word means most nearly the same as the word in heavier type. Notice its number and, on your answer sheet, make a black mark under that number in the corresponding row of answer spaces.

1. The men arrested were taken to the county seat for **prosecution**.
1 protection 2 imprisonment 3 trial 4 punishment 1
2. At the station more than a **score** of persons waited in line.
5 ten 6 twenty 7 forty 8 sixty 2
3. There will be an **audition** in the high school tomorrow evening.
1 reception 2 contest 3 hearing 4 display 3
4. Their **descendants** may be counted by dozens.
5 disciples 6 uncles 7 grandfathers 8 grandchildren 4
5. We thought of Mr. Wells as a **benevolent** man.
1 kindly disposed 2 cruel 3 selfish 4 courteous 5
6. The man has a **pessimistic** outlook on life.
5 hopeful 6 selfish 7 hopeless 8 intelligent 6
7. Members of the Third Missouri Regiment and **auxiliary** police were called on to help with the crowds.
1 specially trained 2 assistant 3 employed by the state 4 without uniforms 7
8. The mayor spoke **candidly** concerning the proposed bond issue.
5 briefly 6 forcefully 7 in a straightforward manner 8 with much caution 8
9. Political considerations will have a special part in the **deliberations** of the lawmakers.
1 influences 2 decisions 3 forming of prejudices 4 weighing of reasons 9
10. Three of the graduates were **eligible** for a position in the school system.
5 incapable 6 selected 7 qualified 8 taken on approval 10
11. We noted a **reluctance** on the part of the students to attend the movie.
1 eagerness 2 willingness 3 unwillingness 4 determined objection 11
12. The amount of money he had was **inadequate** for the week's expenses.
5 sufficient 6 more than enough 7 not enough 8 equal to 12
13. It is **incredible** that Henry would be late.
1 peculiar 2 unusual 3 believable 4 unbelievable 13
14. The importance of the event will make it loom in the history of the **decade**.
5 generation 6 century 7 twenty-year period 8 ten-year period 14
15. Future **chroniclers** will write critically of the events of today.
1 poets 2 judges 3 historians 4 politicians 15
16. In this situation Mary has **precedence**, I am certain.
5 precaution 6 intelligence 7 first place 8 last word 16
17. In class today we talked about **celestial** things.
1 heavenly 2 earthly 3 peaceful 4 warlike 17
18. The workmen found the tool to be **indispensable** for the work they had to do.
5 useless 6 necessary 7 unhandy 8 expensive 18
19. Because Americans are **aggressive**, they sometimes give offense.
1 prosperous 2 talkative 3 increasing in power 4 pushing forward 19
20. The sudden **termination** of hostilities was not expected.
5 ending 6 outbreak 7 interruption 8 declaration 20

TEST 5. Pronunciation

DIRECTIONS: For each of the following words you are to indicate the number of syllables and then the syllable on which the accent is placed.

| Sample: remorsefully | Syllables | | | | | Accent | | | | |
|----------------------|-----------|---|---|---|---|--------|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 0 | 1 | 2 | 3 | 4 |
| | ⋮ | ⋮ | ⋮ | ■ | ⋮ | ⋮ | ⋮ | ■ | ⋮ | ⋮ |

In the word **remorsefully** there are 4 syllables; in the first row of answer spaces, under the number 4, there is a heavy mark to show this. The accent in the word is on the second syllable; therefore, in the next row of answer spaces there is a heavy mark in the space under the number 2. If a word is of one syllable only, make a heavy black mark under 0 in the second column of answer spaces.

TEST 4

| | 1 | 2 | 3 | 4 |
|----|---|---|---|---|
| 1 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 2 | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ |
| 3 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 4 | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 6 | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ |
| 7 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 8 | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ |
| 9 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 10 | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 12 | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 14 | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 16 | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 18 | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ |
| 5 | ⋮ | ⋮ | ⋮ | ⋮ |
| 20 | ⋮ | ⋮ | ⋮ | ⋮ |



Syllables

Accent

1. operating

| | | | | | |
|---|---|---|---|---|---|
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

2. formation

| | | | | | |
|---|---|---|---|---|---|
| 2 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

3. flames

| | | | | | |
|---|---|---|---|---|---|
| 3 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

4. curiously

| | | | | | |
|---|---|---|---|---|---|
| 4 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

5. interesting

| | | | | | |
|---|---|---|---|---|---|
| 5 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

6. shipped

| | | | | | |
|---|---|---|---|---|---|
| 6 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

7. industrial

| | | | | | |
|---|---|---|---|---|---|
| 7 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

8. reference

| | | | | | |
|---|---|---|---|---|---|
| 8 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

9. destroyed

| | | | | | |
|---|---|---|---|---|---|
| 9 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

10. reliable

| | | | | | |
|----|---|---|---|---|---|
| 10 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |



11. jewelry

| | | | | | |
|----|---|---|---|---|---|
| 11 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

12. accidentally

| | | | | | |
|----|---|---|---|---|---|
| 12 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

13. conferred

| | | | | | |
|----|---|---|---|---|---|
| 13 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

14. definitely

| | | | | | |
|----|---|---|---|---|---|
| 14 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

15. passed

| | | | | | |
|----|---|---|---|---|---|
| 15 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

16. really

| | | | | | |
|----|---|---|---|---|---|
| 16 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

17. temperament

| | | | | | |
|----|---|---|---|---|---|
| 17 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

18. laboratory

| | | | | | |
|----|---|---|---|---|---|
| 18 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

19. morale

| | | | | | |
|----|---|---|---|---|---|
| 19 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

20. fuel

| | | | | | |
|----|---|---|---|---|---|
| 20 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 1 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| | | | | | |
|---|---|---|---|---|---|
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 0 | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

TESTS
4 AND 5
TOTAL
SCORE

Barrett-Ryan-Schrammel English Test: NEW EDITION

| TEST 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | SCORES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|---|---|---|---|---|---|---|---|---|----|--------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| | | | | | | | | | | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 |
| TEST 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 |
| TEST 3 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 |

Name _____ Sex: M _____ F _____ Grade _____ Date of Testing _____
 School _____ City and State _____ Date of Birth _____
 Teacher _____ Class or Section _____ Student's Age _____

FORM OF TEST

DM EM FM

(Circle one)

_____ Year _____ Month _____ Day
 _____ Year _____ Month _____ Day
 _____ Years _____ Months _____ Days

NOTE. This Answer Sheet is not to be used for machine scoring.


[illegible]

| | 1 | 2 | 3 |
|----|---|---|---|
| 31 | 1 | 2 | |
| 32 | a | b | c |
| 33 | 1 | 2 | |
| 34 | a | b | c |
| 35 | 1 | 2 | |
| 36 | a | b | c |
| 37 | 1 | 2 | |
| 38 | a | b | c |
| 39 | 1 | 2 | |
| 40 | a | b | c |
| 41 | 1 | 2 | 3 |
| 42 | a | b | c |
| 43 | 1 | 2 | |
| 44 | a | b | c |

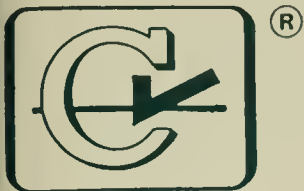
| | TEST | | |
|----|------|---|---|
| | 1 | 3 | 4 |
| 1 | 1 | 2 | 4 |
| 2 | 2 | 3 | 4 |
| 3 | 4 | 5 | 6 |
| 4 | 1 | 3 | 4 |
| 5 | 1 | 3 | 4 |
| 6 | 2 | 3 | 4 |
| 7 | 1 | 2 | 4 |
| 8 | 1 | 2 | 4 |
| 9 | 3 | 5 | 6 |
| 10 | 1 | 2 | 3 |
| 11 | 1 | 2 | 4 |
| 12 | 1 | 2 | 4 |
| 13 | 1 | 2 | 4 |
| 14 | 1 | 2 | 6 |
| 15 | | | |

| | | |
|----|---|---|
| | 1 | 2 |
| 16 | : | : |
| | 1 | 3 |
| 17 | : | : |
| | 1 | 2 |
| 18 | : | : |
| | 1 | 2 |
| 19 | : | : |
| | 1 | 2 |
| 20 | : | : |
| | 2 | 3 |
| 21 | : | : |
| | 1 | 2 |
| 22 | : | : |
| | 1 | 2 |
| 23 | : | : |
| | 1 | 2 |
| 24 | : | : |
| | 1 | 2 |
| 25 | : | : |
| | 1 | 2 |
| 26 | : | : |
| | 1 | 2 |
| 27 | : | : |
| | 1 | 2 |
| 28 | : | : |
| | 1 | 3 |
| 29 | : | : |
| | 2 | 3 |
| 30 | : | : |
| | 1 | 2 |
| 31 | : | : |
| | 1 | 2 |
| 32 | : | : |
| | 1 | 2 |
| 33 | : | : |
| | 1 | 2 |
| 34 | : | : |
| | 1 | 2 |
| 35 | : | : |
| | 1 | 2 |
| 36 | : | : |
| | 1 | 2 |
| 37 | : | : |
| | 1 | 2 |
| 38 | : | : |
| | 1 | 2 |
| 39 | : | : |
| | 1 | 2 |
| 40 | : | : |
| | 1 | 2 |
| 41 | : | : |
| | 1 | 2 |
| 42 | : | : |
| | 1 | 2 |
| 43 | : | : |
| | 1 | 2 |
| 44 | : | : |
| | 1 | 2 |
| 45 | : | : |

TEST 3

| | | | | | |
|---|---|-----|---|-----|----|
| 1 | : | , | ? | ; | NP |
| 2 | : | . | ? | . | NP |
| 3 | : | . | ? | ; | NP |
| 4 | : | . | ? | ; | NP |
| 5 | : | , | ? | ; | NP |
| 6 | : | , | ? | ; | NP |
| 7 | : | . | ? | ; | NP |
| 8 | : | . | ? | ; | NP |
| 9 | : | , | ? | ; | NP |
| 10 | : | , | ? | ; | NP |
| 11 | : | , | ? | ; | NP |
| 12 | : | . | ? | ; | NP |
| 13 | : | , | ? | ; | NP |
| 14 | : | . | ? | ; | NP |
| 15 | . | “ ” | ? | “ ” | NP |
|  | | | | | |
| 16 | . | “ ” | ? | “ ” | NP |
| 17 | . | “ ” | ? | “ ” | NP |
| 18 | . | “ ” | ? | “ ” | NP |
| 19 | . | “ ” | ? | “ ” | NP |
| 20 | . | “ ” | ? | “ ” | NP |
| 21 | . | “ ” | ? | “ ” | NP |
| 22 | , | , | — | — | NP |
| 23 | , | , | — | — | NP |
| 24 | , | , | — | — | NP |
| 25 | , | , | — | — | NP |
| 26 | , | , | — | — | NP |
| 27 | , | , | — | — | NP |
| 28 | , | , | — | — | NP |
| 29 | , | , | — | — | NP |
| 30 | , | , | — | — | NP |

APPENDIX C



Copy No. _____

Form A

California Analogies and Reasoning Test

DEvised BY CLAUDE MITCHELL

| | | |
|---|--------------------|--|
| Name | Grade | Sex |
| _____ <small>Last First Middle</small> | _____ | M - F |
| School | City | Date of Test |
| _____ | _____ | _____ <small>Month Day Year</small> |
| Examiner | () Your Age Today | Date of Birth |
| _____ | _____ | _____ <small>Month Day Year</small> |

| | | |
|----------------------|----------------------|----------------------|
| STAND. SCORE | RAW SCORE | %-ile RANK |
| <input type="text"/> | <input type="text"/> | <input type="text"/> |

| | | | | | | | | | | | | | | |
|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 98 | 99 |
| PERCENTILE SCALE (Mark examinee's %-ile rank here) | | | | | | | | | | | | | | |

| | | | | |
|---------------------------|---------|-------|---|--|
| 10 | 11 | 12 | 1 | |
| CHECK LEVEL OF NORMS USED | | | | |
| High School | College | Other | | |

INSTRUCTIONS TO EXAMINEES:

This is a test of your ability to reason and make analogies. In taking it you will show how well you understand terms and their relationships. No one is expected to do the whole test correctly, but you should answer as many items as you can. Work as fast as you can without making mistakes.

DO NOT WRITE OR MARK ON THIS TEST BOOKLET UNLESS TOLD TO DO SO BY THE EXAMINER.

3rd Printing

INSTRUCTIONS TO EXAMINEES

On the following pages you will find a series of items which will test your understanding of terms, or of the relationship of terms, or both. An illustrative problem is presented below. A second sample problem will give you an opportunity to test yourself to be certain that you understand how to determine the right answers. Now read Sample A.

Sample A: **EAGLE : TROUT** as
 ¹ mammal : fish
 ² beak : talons
 ³ parasite : host
 ⁴ feathers : scales _____A

This problem is read as follows: **EAGLE** is to **TROUT** as ¹mammal is to fish, ²beak is to talons, ³parasite is to host, and ⁴feathers is to scales.

This is a problem of relationships. Before it can be solved, one needs to know the meaning of eagle and trout. The eagle, then, is a large bird and the trout is a fish. The problem might now be read as "bird is to fish as —" and give the same meaning. Now see which of the four answers has a relationship to bird and fish. Perhaps you might select No. 1, "mammal is to fish," as the answer, but this is not correct since the eagle is not a mammal. No. 2, "beak is to talons," is not correct because although it is true that an eagle has a beak, it is not true that a trout has talons. No. 3, "parasite is to host," does not satisfy since the eagle is not a parasite. No. 4, "feathers is to scales," however, gives evidence of being an answer. The covering of the eagle (bird) is one of feathers, and the trout (fish) has a covering of scales. Hence No. 4 satisfies the problem and is the answer. Now try your skill on Sample B.

Sample B: **30 : 10** as
 ¹ 10 : 3
 ² 6 : 2
 ³ 15 : 12
 ⁴ 9 : 6 _____B

Select the answer among the four given in this problem that has the same relationship between the two numbers that exists between 30 and 10. That number is your choice for the correct answer. Now read the directions below appropriate to the method of marking your answer.

DIRECTIONS FOR MARKING ANSWERS ON THE ANSWER SHEET

If you think that No. 1, 10:3, is correct, you will make a heavy mark within the pair of dotted lines under the 1 after Sample B on your answer sheet as shown below.

Sample B: 1 2 3 4
 | :: :: ::

If you choose answer 2, 3, or 4, however, your mark will be under that number.

You will be given 40 minutes in which to complete the 101 analogies that comprise this test. Do not spend too much time on items that are difficult for you. You may come back to them later if you have time. Make no stray marks on your answer sheet; they may count against you. If you change an answer, be sure to erase the old mark completely.

Now record your choice for Sample B at the top of your answer sheet. That is the way all of your answers are to be made.

DO NOT TURN THIS PAGE UNTIL TOLD TO DO SO.

DIRECTIONS FOR MARKING ANSWERS ON THE BOOKLET

Write the number of the answer you have decided is correct on the answer line to the right of Sample B above. Do it now. That is the way all your answers are to be made. In recording your choice, write the number clearly.

You will be given 40 minutes in which to complete the 101 analogies that comprise this test. Do not spend too much time on items that are difficult for you. You may come back to them later if you have time.

DO NOT TURN THIS PAGE UNTIL TOLD TO DO SO.

1. EARTH : MOON as

- ¹ asteroid : meteor
- ² planet : satellite
- ³ orbit : tropic
- ⁴ hemisphere : zone _____ 1

2. SINGULAR : PLURAL as

- ¹ mice : children
- ² geese : news
- ³ man : woman
- ⁴ he : we _____ 2

3. THERMOSTAT : GEIGER COUNTER as

- ¹ electricity : radio
- ² heat : uranium
- ³ pressure : current
- ⁴ voltage : capacity _____ 3

4. PARASITE : HOST as

- ¹ feathers : duck
- ² tapeworm : man
- ³ fur : seal
- ⁴ horns : cow _____ 4

5. INFLATION : DEFLATION as

- ¹ money : credit
- ² debt : interest
- ³ high prices : low prices
- ⁴ debit : asset _____ 5

6. GALAHAD : RIP VAN WINKLE as

- ¹ Smith : Heinrich
- ² McDougal : Pierce
- ³ Tennyson : Irving
- ⁴ Gladstone : Balfour _____ 6

7. FRANCE : SEINE as

- ¹ Germany : Berlin
- ² Norway : Sweden
- ³ Turkey : Greece
- ⁴ Egypt : Nile _____ 7

8. GYROSCOPE : MICROSCOPE as

- ¹ stabilizer : magnifier
- ² propeller : blower
- ³ strengthener : mover
- ⁴ builder : wrecker _____ 8

9. PHARYNX : LARYNX as

- ¹ liquid : solid
- ² swallow : voice
- ³ gland : vertebra
- ⁴ secretion : excretion _____ 9

10. CENTIGRADE : FAHRENHEIT as

- ¹ heat : cold
- ² dark : light
- ³ 100° : 212°
- ⁴ wet : dry _____ 10

11. INDIVIDUALISM : COLLECTIVISM as

- ¹ democracy : socialism
- ² oppression : freedom
- ³ anarchy : crime
- ⁴ morale : slavery _____ 11

12. HEART : STOMACH as

- ¹ blood : food
- ² nails : hair
- ³ nerve : bone
- ⁴ toes : fingers _____ 12

13. INCUBATE : INOCULATE as

- ¹ live upon : secrete
- ² plasma : parathyroid
- ³ hatch : inject
- ⁴ plumule : pleura _____ 13

14. SOLAR : LUNAR as

- ¹ sun : moon
- ² sea : land
- ³ weight : gravity
- ⁴ earth : planet _____ 14

15. **NATURE : MAN** as
1 feminine : neuter
2 masculine : feminine.
3 neuter : masculine
4 feminine : objective _____15

16. **FICTION : BIOGRAPHY** as
1 The Raven : Leaves of Grass
2 Grant's Memoirs : Evangeline
3 Gone with the Wind : King Lear
4 Babbit : Sandburg's Life of Lincoln _____16

17. **AESOP : SWIFT** as
1 glory : shame
2 theft : honesty
3 fable : satire
4 happiness : sorrow _____17

18. **FREUD : NEWTON** as
1 mathematics : music
2 dreams : gravitation
3 atom : molecule
4 valence : interference _____18

19. **GANDHI : KAGAWA** as
1 Rome : Berlin
2 India : Japan
3 Spain : Turkey
4 Russia : Germany _____19

20. **ESPIONAGE : ESPERANTO** as
1 spying : language
2 science : labor
3 tax : duty
4 farmers : industrialists _____20

21. **DEMOSTHENES : HERODOTUS** as
1 poetry : science
2 oratory : history
3 logic : law
4 morals : religion _____21

22. **AXIOM : THEOREM** as
1 identical : converse
2 increase : similar
3 hypothesis : lemma
4 assumed truth : reasoned truth _____22

23. **ZONE : PRODUCTS** as
1 plants : animals
2 soil : rocks
3 rainfall : moisture
4 temperature : plants _____23

24. **SEBACEOUS : GASTRIC** as
1 sweat : blood
2 skin : stomach
3 hair : nails
4 protein : fat _____24

25. **CLAUSE : CONJUNCTION** as
1 adverb : noun
2 pronoun : objective
3 phrase : preposition
4 complement : modifier _____25

26. **MASON AND DIXON : SLAVERY** as
1 42nd parallel : Pennsylvania
2 Ohio : Mississippi
3 38th parallel : communism
4 Rio Grande : Texas _____26

27. **PREAMBLE : CONSTITUTION** as
1 amendment : repeal
2 Congress : law
3 court : decision
4 introduction : address _____27

28. **GERRYMANDERING : IMPEACHMENT** as
1 veto : voting
2 affirmation : negation
3 unfairness : accusation
4 scandalous : administering _____28

29. NOAH WEBSTER : DANIEL WEBSTER as

- ¹ lexicographer : orator
- ² poet : general
- ³ architect : artist
- ⁴ scientist : inventor _____29

30. KOCH : REED as

- ¹ polio : fly
- ² pollen : typhoid
- ³ t.b. germ : mosquito
- ⁴ spores : hay fever _____30

31. AMENDMENT XVIII : AMENDMENT XXI as

- ¹ bearing arms : income tax
- ² prohibition : repeal
- ³ negro suffrage : elections
- ⁴ states' rights : woman suffrage _____31

32. PIANISSIMO : FORTISSIMO as

- ¹ slow : rapid
- ² soft : loud
- ³ shrill : dull
- ⁴ smooth : intermittent _____32

33. MOON : SUN as

- ¹ 10,000 mi. : 3 million mi.
- ² 500,000 mi. : 50 million mi.
- ³ 100,000 mi. : 85 million mi.
- ⁴ 240,000 mi. : 93 million mi. _____33

34. ANCESTRAL WORSHIP : CASTE as

- ¹ Egypt : Iran
- ² China : India
- ³ Turkey : Arabia
- ⁴ Persia : Siam _____34

35. INSECURE : SECURELY as

- ¹ synonym : root
- ² prefix : suffix
- ³ article : antonym
- ⁴ syntax : phrase _____35

36. ANALYSIS : SYNTHESIS as

- ¹ tearing down : building up
- ² words : facts
- ³ lowering : raising
- ⁴ sound : fluid _____36

37. BIOLOGY : GEOLOGY as

- ¹ animals : plants
- ² rocks : fish
- ³ life : earth strata
- ⁴ fossils : insects _____37

38. OGLETHORPE : GEORGIA as

- ¹ Williams : Rhode Island
- ² Cotton : China
- ³ Pitt : Pittsburgh
- ⁴ Bangor : Maine _____38

39. CONJUNCTION : PROSODY as

- ¹ punctuation : modification
- ² apposition : diction
- ³ connection : versification
- ⁴ precision : unity _____39

40. ELEGY IN A COUNTRY CHURCH-YARD : THE RAVEN as

- ¹ Scott : Irving
- ² Gray : Poe
- ³ Browning : Burns
- ⁴ Gay : Mills _____40

41. MALTHUS : EINSTEIN as

- ¹ statistics : pressure
- ² organic : inorganic
- ³ population : relativity
- ⁴ authority : obedience _____41

42. SOUND : LIGHT as

- ¹ fluid : pressure
- ² 1100 ft. : 186,000 miles
- ³ gravity : liquid
- ⁴ height : density _____42

43. REYNARD : DOBBIN as

- ¹ squirrel : opossum
- ² monkey : rabbit
- ³ tiger : lion
- ⁴ fox : horse _____43

**44. CROSSING THE BAR :
SNOWBOUND** as

- ¹ Shelley : Byron
- ² King : Harding
- ³ Tennyson : Whittier
- ⁴ Cowper : Cooper _____44

45. HIPPOCRATES : MEDICINE as

- ¹ Newton : poetry
- ² Caesar : Greece
- ³ Columbus : Spain
- ⁴ Herodotus : history _____45

**46. MENDELIAN THEORY :
EVOLUTIONARY THEORY** as

- ¹ growth : decay
- ² speed : momentum
- ³ inheritance : development
- ⁴ analysis : synthesis _____46

47. PERIMETER : LENGTH as

- ¹ length : width
- ² breadth : thickness
- ³ parameter : height
- ⁴ circumference : diameter _____47

48. AMENDMENT I : AMENDMENT XIX

- as
- ¹ lame duck : jury
 - ² slavery : prohibition
 - ³ religion : suffrage
 - ⁴ process of law : senatorial election _____48

49. INSULIN : EPINEPHRINE as

- ¹ thyroid : salivary
- ² pituitary : gonad
- ³ pancreas : adrenal
- ⁴ pineal : platelets _____49

50. SIX : NINE as

- ¹ 3 : 2
- ² 36 : 81
- ³ 2 : 3
- ⁴ 6 : 12 _____50

51. EUPHONY : PROVINCIALISM as

- ¹ pleasing sound : regional use
- ² coherence : slang
- ³ vulgarism : idiom
- ⁴ hackneyed : reflexive _____51

52. $\sqrt{64}$: $\sqrt{225}$ as

- ¹ 7 : 16
- ² 4 : 25
- ³ 8 : 15
- ⁴ 16 : 35 _____52

53. PARTHENOGENESIS : OSMOSIS as

- ¹ unfertilized reproduction : diffusion
- ² organic : planaria
- ³ ovule : phylum
- ⁴ egg : spores _____53

54. PERIOSTEUM : PERICARDIUM as

- ¹ muscle : nerve
- ² liver : brain
- ³ bone : heart
- ⁴ kidney : lung _____54

55. ERG : ENERGY as

- ¹ proton : neutron
- ² watt : electricity
- ³ momentum : mass
- ⁴ weight : temperature _____55

56. PARODY : PARADOX as

- ¹ proof : mutation
- ² parole : parade
- ³ chance : change
- ⁴ imitation : contradiction _____56

57. **LOUISIANA : PARISH** as
1 California : desert
2 Oregon : salmon
3 Alabama : cotton
4 Pennsylvania : county _____57

58. **FEMUR : HUMERUS** as
1 leg : arm
2 fracture : splint
3 dust : gland
4 breast : heart _____58

59. **HYPERBOLE : IRONY** as
1 exaggeration : ridicule
2 description : criticism
3 dominance : praise
4 truth : fiction _____59

60. **AURORA BOREALIS : WILL-O'-THE-WISP** as
1 planet : satellite
2 comet : meteorite
3 northern light : evanescently glowing algae
4 halo on the moon : halo on the sun _____60

61. **ABSOLUTE HUMIDITY : RELATIVE HUMIDITY** as
1 vapor : temperature
2 vapor per unit : percentage of vapor
3 evaporation : moisture
4 liquifaction : oxidation _____61

62. **BACTERIA : PROTOZOA** as
1 fish : oysters
2 soil : air
3 plants : animals
4 disease : remedy _____62

63. **HOLY ALLIANCE : METTERNICH** as
1 League of Nations : Wilson
2 compromise : Pope
3 Bill of Rights : Adams
4 law : Clay _____63

64. **HYDROGEN NITRATE : POTASSIUM HYDROXIDE** as
1 acid : base
2 metal : gas
3 alkali : salt
4 osmosis : catalysis _____64

65. **DORIC : CORINTHIAN** as
1 weak : firm
2 simple : elaborate
3 stone : wood
4 exhilarating : depressive _____65

66. **CATHODE : ANODE** as
1 proton : neutron
2 destroy : repair
3 affirm : refute
4 negative : positive _____66

67. **ATHEIST : AGNOSTIC** as
1 believes : denies
2 agrees : thinks
3 rejoices : weeps
4 denies : neither affirms nor denies _____67

68. **TWO-NINTHS : THREE-FOURTHS** as
1 1 : 3
2 8 : 27
3 3 : 7
4 7 : 9 _____68

69. **POETRY : PROSE** as
1 Snowbound : Uncle Tom's Cabin
2 Gold Bug : Ivanhoe
3 House of Seven Gables : Babbitt
4 The Jungle : Tale of Two Cities _____69

70. **ISOTHERM : ISOBAR** as
1 isosceles : icicle
2 heat : pressure
3 highland : lowland
4 rainfall : season _____70

71. THREE MUSKETEERS : DAS KAPITAL as

- ¹ Dumas : Marx
- ² Clemens : Heine
- ³ Hardy : Cooper
- ⁴ Herrick : Emerson _____71

72. 1 LB. 8 OZ. : 3 LBS. 6 OZ. as

- ¹ 5 : 8
- ² 4 : 9
- ³ 6 : 8
- ⁴ 1 : 3 _____72

73. REDUNDANCY : PARALLELISM as

- ¹ clearness : unity
- ² slang : inflection
- ³ comparison : limitation
- ⁴ wordiness : same structure _____73

74. ALLITERATION : COLLOQUIALISM as

- ¹ abrupt : smooth
- ² loud : silent
- ³ rhyming : conversational
- ⁴ clear : obscure _____74

75. METRONOME : HELIOGRAPH as

- ¹ pressure : temperature
- ² clouds : rain
- ³ music : sun
- ⁴ climate : seasons _____75

76. SUPPLEMENT OF ANGLE : COMPLEMENT OF ANGLE as

- ¹ 180° minus the \angle : 90° minus the \angle
- ² 90° minus the \angle : 60° minus the \angle
- ³ 180° minus 90° : 90° minus 45°
- ⁴ 360° minus 180° : 375° minus 45° _____76

77. CENTRIFUGAL : CENTRIPETAL as

- ¹ from center : to center
- ² to center : from center
- ³ left : right
- ⁴ cold : hot _____77

78. VOLTS : AMPERES as

- ¹ electricity : light
- ² pressure : flow
- ³ current : static
- ⁴ battery : cell _____78

79. TREATY MAKING : REVENUE RAISING as

- ¹ treasury : tax
- ² court : judge
- ³ Senate : House
- ⁴ envoy : consul _____79

80. PLANTS : MOLDS as

- ¹ spores : bacteria
- ² streptococcus : toxin
- ³ chlorophyll : penicillin
- ⁴ stamen : pollen _____80

81. FIRST PERSON : THIRD PERSON as

- ¹ I : Mary
- ² Henry : you
- ³ they : she
- ⁴ you : me _____81

82. SPORES : MUSHROOMS as

- ¹ thorns : locusts
- ² roots : carrots
- ³ seeds : cucumbers
- ⁴ leaves : trees _____82

83. TRANSITIVE : INTRANSITIVE as

- ¹ ate : were
- ² fall : swim
- ³ limp : was
- ⁴ is : see _____83

84. NADIR : ZENITH as

- ¹ east : west
- ² north : west
- ³ down : up
- ⁴ south : east _____84

85. COPERNICUS : SOLAR SYSTEM as

- ¹ Adam : Garden of Eden
- ² Marco Polo : China
- ³ Alexander the Great : India
- ⁴ Columbus : New World _____85

**86. CIRCUMFERENCE OF CIRCLE :
RADIUS OF CIRCLE as**

- ¹ $2R : \pi$
- ² $2\pi R : R$
- ³ $\pi : \pi R$
- ⁴ $C : R$ _____86

87. EXPLETIVE : ELLIPSIS as

- ¹ limit : revise
- ² introduce : minimize
- ³ emphasis : omission
- ⁴ explanation : modification _____87

**88. SURFACE OF CUBE : VOLUME OF
CUBE as**

- ¹ $4C : C^2$
- ² $6C^2 : C^3$
- ³ $C^2 : C^3$
- ⁴ $C^2 : 6C$ _____88

89. CXL : LXX as

- ¹ CM : DC
- ² M : D
- ³ MCM : M
- ⁴ CD : DCC _____89

90. $25^\circ \angle$: COMPLEMENT $25^\circ \angle$ as

- ¹ $25^\circ : 72^\circ$
- ² $5^\circ : 13^\circ$
- ³ $25^\circ : 45^\circ$
- ⁴ $155^\circ : 25^\circ$ _____90

91. OVIPAROUS : VIVIPAROUS as

- ¹ man : monkey
- ² sheep : hog
- ³ shrimp : fish
- ⁴ bird : bat _____91

**92. ORIGIN OF SPECIES :
HELIOCENTRIC THEORY as**

- ¹ Erasmus : Curie
- ² Socrates : Hertz
- ³ Goethe : Hannibal
- ⁴ Darwin : Copernicus _____92

93. GREECE : ART as

- ¹ Rome : law
- ² China : pottery
- ³ Egypt : Nile
- ⁴ Babylon : religion _____93

94. AXIS : ORBIT as

- ¹ sun : moon
- ² day : year
- ³ day : night
- ⁴ month : season _____94

95. CANONIZE : PLAGIARIZE as

- ¹ cannonade : display
- ² sanctify : steal
- ³ war : peace
- ⁴ bombard : pacify _____95

96. AMPHIBIAN : TOAD as

- ¹ chicken : arthropod
- ² whale : fish
- ³ paramecium : spider
- ⁴ mammal : horse _____96

**97. PENTAGON CENTRAL \angle :
HEXAGON CENTRAL \angle as**

- ¹ $60^\circ : 90^\circ$
- ² $90^\circ : 108^\circ$
- ³ $72^\circ : 60^\circ$
- ⁴ $45^\circ : 120^\circ$ _____97

98. TULAREMIA : PSITTACOSIS as
¹ dog : squirrel
² rabbit : parrot
³ monkey : cat
⁴ turkey : chicken _____98

99. SLUMS : PEASANTS as
¹ Buel : Adam Smith
² Thomas Burke : Tolstoy
³ Emerson : J. E. Miller
⁴ Livingstone : Goethe _____99

100. PHAGOCYTES : RED CORPUSCLES
as
¹ friend : enemy
² bacteria : germ
³ police : civilians
⁴ farmer : merchant _____100

101. $\sqrt{3}$: $\sqrt{27}$ as
¹ 1 : 9
² 3 : 15
³ 1 : 3
⁴ 3 : 5 _____101

APPENDIX D

SCORE

NAME _____
(PRINT) LAST FIRST MIDDLE
AGE _____ GRADE OR CLASS _____
YEARS MONTHS
SCHOOL _____
TODAY'S DATE _____ 1. _____
MONTH DAY YEAR
2. _____ 3. _____

DO NOT
WRITE
HERE

Cooperative
Sequential Tests of Educational Progress
Essay Test

General Directions

The purpose of this test is to find out how well you can write an essay. First you will read a short passage which will tell you what you are to write about. Then you should plan what you want to say and the order in which you want to say it. As soon as you have finished planning, you should begin to write. You will have about thirty minutes for writing.

Here are a few suggestions which will help you to do your best on the test:

1. Start planning your paper as soon as you know what you are to do. You may use the space underneath the reading passage or the back of your booklet for making notes about your plans.
 2. While spelling and punctuation will be considered in grading your paper, what you have to say and how well you say it will be more important. Therefore, you should spend most of your time getting your ideas down in a clear, well-organized form. Watch your handwriting, too; your paper cannot be marked if no one can read it.
 3. Save a little time at the end to check your paper and make any needed changes. Since there will not be time to copy what you write, make your changes neatly by writing between the lines.
-

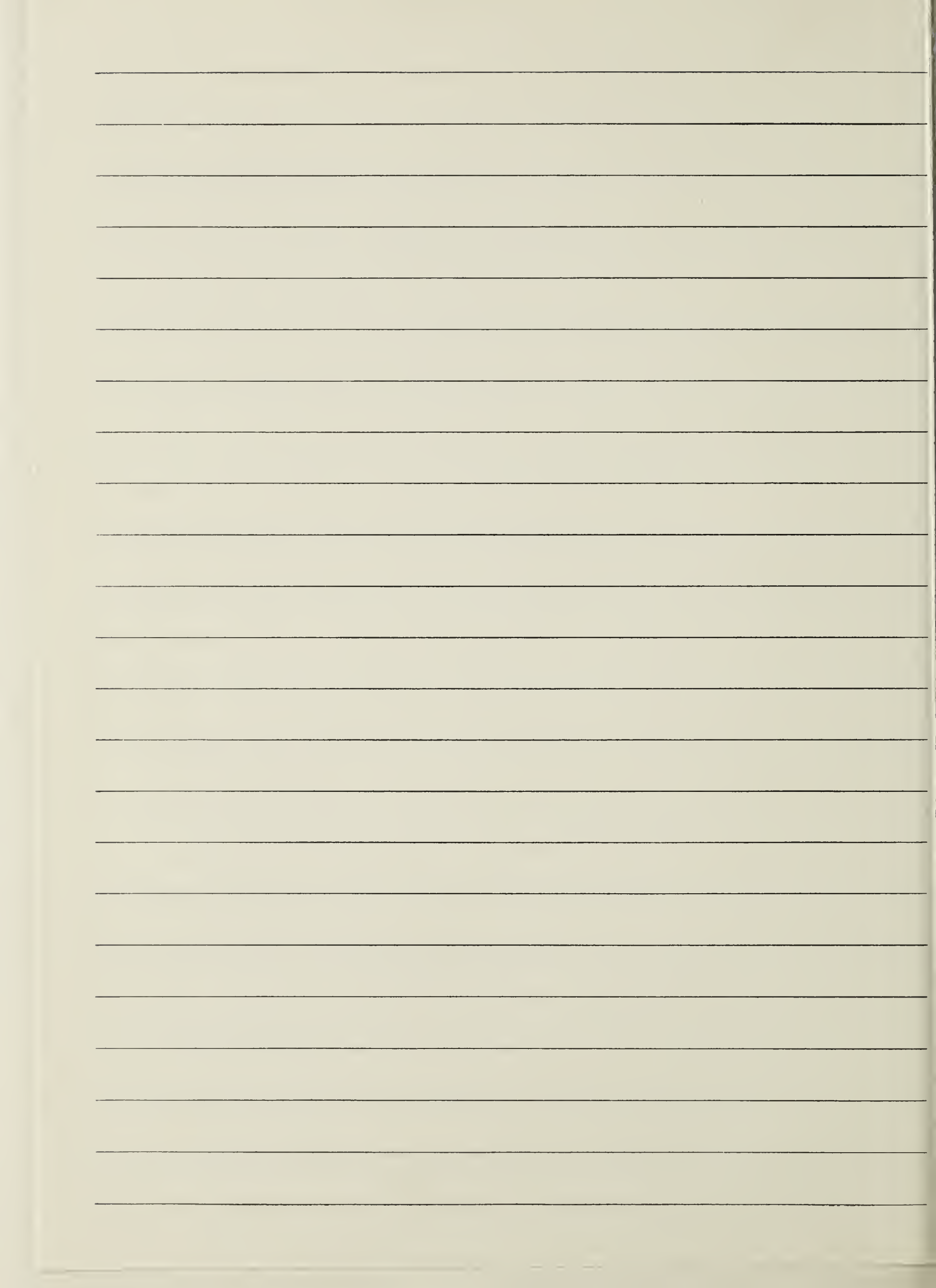
Do not turn the page until you are told to do so.

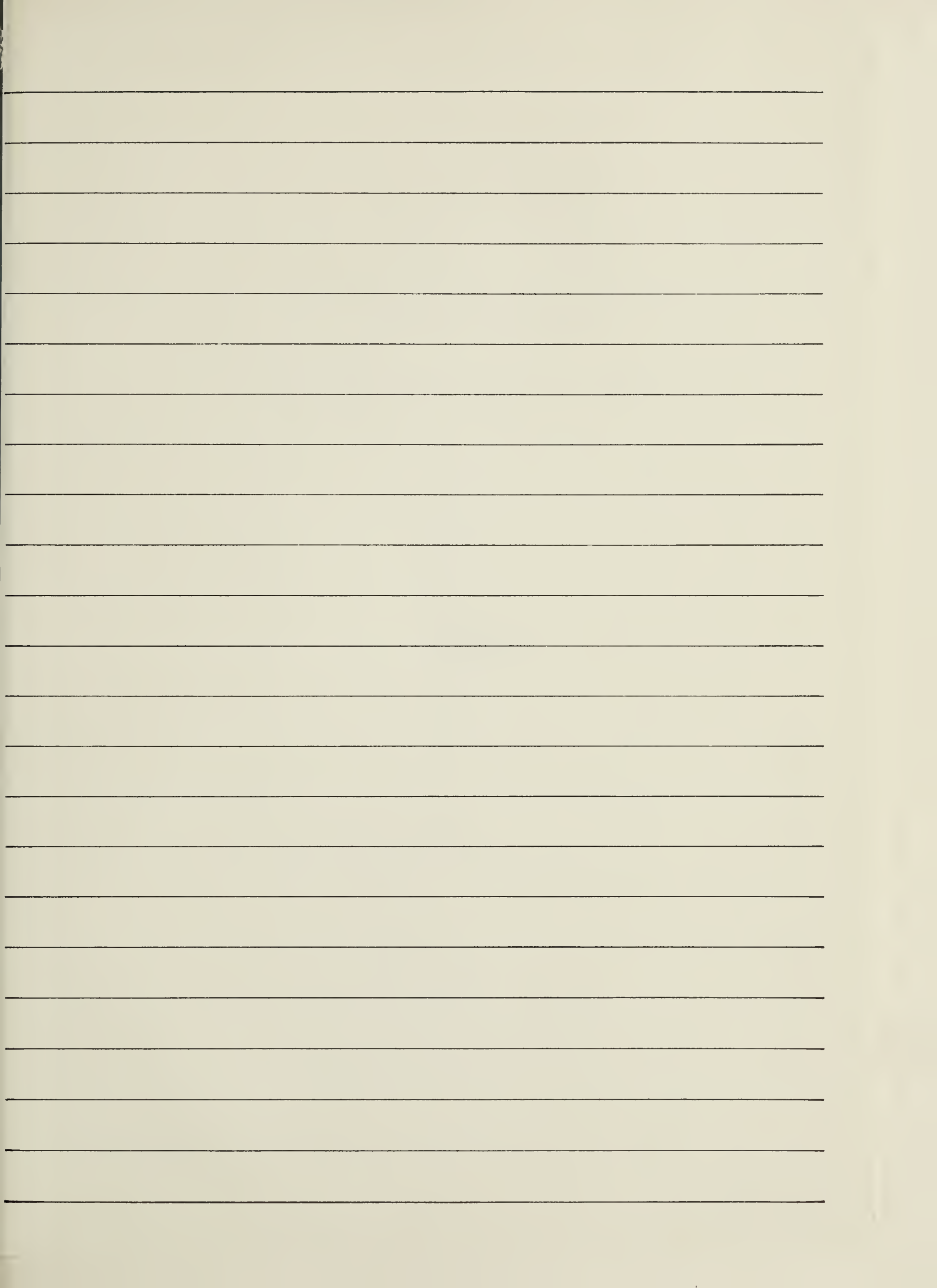
Teen-agers often find their situation confusing, because they are sometimes treated as adults, sometimes as children. When should teen-agers be treated as adults? You might consider some of the following questions in making your decision:

- (a) Are you mature when you reach a certain age? (The government considers eighteen a satisfactory age for military service.)
- (b) Are you mature when you graduate from high school? (The high school diploma indicates that you are ready for work or for college.)
- (c) Are you mature when you have a regular job and are self-supporting? (Many high school students have regular jobs.)
- (d) Are you mature when you can accept responsibility? (Some high school freshmen are more conscientious and dependable than seniors.)

When do *you* think teen-agers should be treated as adults? Give reasons for your opinion, and support it by specific suggestions or examples.







APPENDIX E



TRANSFORMATIONAL GRAMMAR TEST: TEST-RETEST
RELIABILITY RAW SCORES

| Student | Test Score | Retest Score |
|---------|------------|--------------|
| A | 42 | 43 |
| B | 41.5 | 42 |
| C | 41 | 39 |
| D | 39.5 | 32 |
| E | 39.5 | 37.5 |
| F | 37.5 | 32 |
| G | 37 | 39 |
| H | 36 | 40 |
| I | 35.5 | 40 |
| J | 31.5 | 29 |
| K | 31 | 34 |
| L | 27.5 | 33 |
| M | 27.5 | 33 |
| N | 27.5 | 29.5 |
| O | 27 | 32 |
| P | 25 | 27 |
| Q | 23 | 23 |
| R | 22 | 23.5 |
| S | 21.5 | 27.5 |
| T | 20.5 | 22 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|

APPENDIX F

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|

MATCHED GROUPS (X TO XII)

| Student | SCAT Percentile Score | Stanine Total | Laycock I. Q. | Grade VII Achvt. | Junior High School | Boy(B) Girl(G) |
|--------------------------------------|-----------------------------|------------------|------------------|------------------------|--------------------------|-------------------|
| <u>Grade XII: High Ability Level</u> | | | | | | |
| 1 | 95 | 48 | 125 | A | B | G |
| 2 | 97 | 46 | 125 | H | F | G |
| 3 | 94 | 47 | 131 | H | E | G |
| 4 | 96 | 51 | 136 | H | C | G |
| 5 | 96 | 47 | 135 | H | E | G |
| 6 | 95 | 49 | 127 | A | A | B |
| 7 | 94 | 48 | 116 | H | D | B |
| 8 | 95 | 48 | 123 | H | D | B |
| 9 | 95 | 49 | 129 | H | B | B |
| 10 | 96 | 47 | 118 | A | A | B |
| <u>Grade XII: Mid Ability Level</u> | | | | | | |
| 11 | 67 | 34 | 106 | A | E | G |
| 12 | 65 | 38 | 123 | A | B | G |
| 13 | 65 | 37 | 110 | H | E | G |
| 14 | 63 | 31 | 101 | B | C | G |
| 15 | 63 | 35 | 108 | A | B | G |
| 16 | 63 | 38 | 115 | B | C | G |
| 17 | 63 | 37 | 123 | A | A | G |
| 18 | 62 | 37 | 123 | A | B | G |
| 19 | 67 | 32 | 104 | A | A | G |
| 20 | 62 | 32 | 102 | A | B | G |
| 21 | 63 | 34 | 121 | A | J | B |
| 22 | 65 | 33 | 122 | B | D | B |

Table 1. Summary of Data

| Year | Month | Day | Time | Location | Temperature (°C) | Humidity (%) |
|--------------------------------|-------|-----|--------|-----------|------------------|--------------|
| Section 1: Data from 1990-1995 | | | | | | |
| 1990 | Jan | 15 | 10:00 | Station A | 15.2 | 65 |
| 1990 | Feb | 10 | 11:00 | Station B | 18.5 | 70 |
| 1990 | Mar | 05 | 09:00 | Station A | 22.1 | 75 |
| 1990 | Apr | 20 | 12:00 | Station C | 25.8 | 80 |
| 1990 | May | 15 | 14:00 | Station B | 28.3 | 85 |
| 1990 | Jun | 10 | 16:00 | Station A | 30.5 | 90 |
| 1990 | Jul | 05 | 18:00 | Station C | 32.1 | 95 |
| 1990 | Aug | 30 | 20:00 | Station B | 34.5 | 98 |
| 1990 | Sep | 25 | 22:00 | Station A | 36.2 | 100 |
| 1990 | Oct | 20 | 24:00 | Station C | 38.7 | 100 |
| 1990 | Nov | 15 | 26:00 | Station B | 40.1 | 100 |
| 1990 | Dec | 10 | 28:00 | Station A | 42.5 | 100 |
| 1991 | Jan | 05 | 30:00 | Station C | 44.8 | 100 |
| 1991 | Feb | 01 | 32:00 | Station B | 46.2 | 100 |
| 1991 | Mar | 28 | 34:00 | Station A | 48.5 | 100 |
| 1991 | Apr | 24 | 36:00 | Station C | 50.1 | 100 |
| 1991 | May | 20 | 38:00 | Station B | 52.3 | 100 |
| 1991 | Jun | 16 | 40:00 | Station A | 54.5 | 100 |
| 1991 | Jul | 12 | 42:00 | Station C | 56.8 | 100 |
| 1991 | Aug | 08 | 44:00 | Station B | 58.1 | 100 |
| 1991 | Sep | 04 | 46:00 | Station A | 60.5 | 100 |
| 1991 | Oct | 31 | 48:00 | Station C | 62.2 | 100 |
| 1991 | Nov | 27 | 50:00 | Station B | 64.5 | 100 |
| 1991 | Dec | 23 | 52:00 | Station A | 66.8 | 100 |
| 1992 | Jan | 19 | 54:00 | Station C | 68.1 | 100 |
| 1992 | Feb | 15 | 56:00 | Station B | 70.5 | 100 |
| 1992 | Mar | 11 | 58:00 | Station A | 72.8 | 100 |
| 1992 | Apr | 07 | 60:00 | Station C | 74.2 | 100 |
| 1992 | May | 03 | 62:00 | Station B | 76.5 | 100 |
| 1992 | Jun | 29 | 64:00 | Station A | 78.1 | 100 |
| 1992 | Jul | 25 | 66:00 | Station C | 80.5 | 100 |
| 1992 | Aug | 21 | 68:00 | Station B | 82.2 | 100 |
| 1992 | Sep | 17 | 70:00 | Station A | 84.5 | 100 |
| 1992 | Oct | 13 | 72:00 | Station C | 86.8 | 100 |
| 1992 | Nov | 09 | 74:00 | Station B | 88.1 | 100 |
| 1992 | Dec | 05 | 76:00 | Station A | 90.5 | 100 |
| 1993 | Jan | 01 | 78:00 | Station C | 92.2 | 100 |
| 1993 | Feb | 28 | 80:00 | Station B | 94.5 | 100 |
| 1993 | Mar | 24 | 82:00 | Station A | 96.8 | 100 |
| 1993 | Apr | 20 | 84:00 | Station C | 98.1 | 100 |
| 1993 | May | 16 | 86:00 | Station B | 100.5 | 100 |
| 1993 | Jun | 12 | 88:00 | Station A | 102.2 | 100 |
| 1993 | Jul | 08 | 90:00 | Station C | 104.5 | 100 |
| 1993 | Aug | 04 | 92:00 | Station B | 106.8 | 100 |
| 1993 | Sep | 01 | 94:00 | Station A | 108.1 | 100 |
| 1993 | Oct | 28 | 96:00 | Station C | 110.5 | 100 |
| 1993 | Nov | 24 | 98:00 | Station B | 112.2 | 100 |
| 1993 | Dec | 20 | 100:00 | Station A | 114.5 | 100 |
| 1994 | Jan | 16 | 102:00 | Station C | 116.8 | 100 |
| 1994 | Feb | 12 | 104:00 | Station B | 118.1 | 100 |
| 1994 | Mar | 08 | 106:00 | Station A | 120.5 | 100 |
| 1994 | Apr | 04 | 108:00 | Station C | 122.2 | 100 |
| 1994 | May | 31 | 110:00 | Station B | 124.5 | 100 |
| 1994 | Jun | 27 | 112:00 | Station A | 126.8 | 100 |
| 1994 | Jul | 23 | 114:00 | Station C | 128.1 | 100 |
| 1994 | Aug | 19 | 116:00 | Station B | 130.5 | 100 |
| 1994 | Sep | 15 | 118:00 | Station A | 132.2 | 100 |
| 1994 | Oct | 11 | 120:00 | Station C | 134.5 | 100 |
| 1994 | Nov | 07 | 122:00 | Station B | 136.8 | 100 |
| 1994 | Dec | 03 | 124:00 | Station A | 138.1 | 100 |
| 1995 | Jan | 30 | 126:00 | Station C | 140.5 | 100 |
| 1995 | Feb | 26 | 128:00 | Station B | 142.2 | 100 |
| 1995 | Mar | 22 | 130:00 | Station A | 144.5 | 100 |
| 1995 | Apr | 18 | 132:00 | Station C | 146.8 | 100 |
| 1995 | May | 14 | 134:00 | Station B | 148.1 | 100 |
| 1995 | Jun | 10 | 136:00 | Station A | 150.5 | 100 |
| 1995 | Jul | 06 | 138:00 | Station C | 152.2 | 100 |
| 1995 | Aug | 02 | 140:00 | Station B | 154.5 | 100 |
| 1995 | Sep | 29 | 142:00 | Station A | 156.8 | 100 |
| 1995 | Oct | 25 | 144:00 | Station C | 158.1 | 100 |
| 1995 | Nov | 21 | 146:00 | Station B | 160.5 | 100 |
| 1995 | Dec | 17 | 148:00 | Station A | 162.2 | 100 |
| 1996 | Jan | 13 | 150:00 | Station C | 164.5 | 100 |
| 1996 | Feb | 09 | 152:00 | Station B | 166.8 | 100 |
| 1996 | Mar | 05 | 154:00 | Station A | 168.1 | 100 |
| 1996 | Apr | 01 | 156:00 | Station C | 170.5 | 100 |
| 1996 | May | 28 | 158:00 | Station B | 172.2 | 100 |
| 1996 | Jun | 24 | 160:00 | Station A | 174.5 | 100 |
| 1996 | Jul | 20 | 162:00 | Station C | 176.8 | 100 |
| 1996 | Aug | 16 | 164:00 | Station B | 178.1 | 100 |
| 1996 | Sep | 12 | 166:00 | Station A | 180.5 | 100 |
| 1996 | Oct | 08 | 168:00 | Station C | 182.2 | 100 |
| 1996 | Nov | 04 | 170:00 | Station B | 184.5 | 100 |
| 1996 | Dec | 01 | 172:00 | Station A | 186.8 | 100 |
| 1997 | Jan | 28 | 174:00 | Station C | 188.1 | 100 |
| 1997 | Feb | 24 | 176:00 | Station B | 190.5 | 100 |
| 1997 | Mar | 20 | 178:00 | Station A | 192.2 | 100 |
| 1997 | Apr | 16 | 180:00 | Station C | 194.5 | 100 |
| 1997 | May | 12 | 182:00 | Station B | 196.8 | 100 |
| 1997 | Jun | 08 | 184:00 | Station A | 198.1 | 100 |
| 1997 | Jul | 04 | 186:00 | Station C | 200.5 | 100 |
| 1997 | Aug | 31 | 188:00 | Station B | 202.2 | 100 |
| 1997 | Sep | 27 | 190:00 | Station A | 204.5 | 100 |
| 1997 | Oct | 23 | 192:00 | Station C | 206.8 | 100 |
| 1997 | Nov | 19 | 194:00 | Station B | 208.1 | 100 |
| 1997 | Dec | 15 | 196:00 | Station A | 210.5 | 100 |
| 1998 | Jan | 11 | 198:00 | Station C | 212.2 | 100 |
| 1998 | Feb | 07 | 200:00 | Station B | 214.5 | 100 |
| 1998 | Mar | 03 | 202:00 | Station A | 216.8 | 100 |
| 1998 | Apr | 29 | 204:00 | Station C | 218.1 | 100 |
| 1998 | May | 25 | 206:00 | Station B | 220.5 | 100 |
| 1998 | Jun | 21 | 208:00 | Station A | 222.2 | 100 |
| 1998 | Jul | 17 | 210:00 | Station C | 224.5 | 100 |
| 1998 | Aug | 13 | 212:00 | Station B | 226.8 | 100 |
| 1998 | Sep | 09 | 214:00 | Station A | 228.1 | 100 |
| 1998 | Oct | 05 | 216:00 | Station C | 230.5 | 100 |
| 1998 | Nov | 01 | 218:00 | Station B | 232.2 | 100 |
| 1998 | Dec | 28 | 220:00 | Station A | 234.5 | 100 |
| 1999 | Jan | 24 | 222:00 | Station C | 236.8 | 100 |
| 1999 | Feb | 20 | 224:00 | Station B | 238.1 | 100 |
| 1999 | Mar | 16 | 226:00 | Station A | 240.5 | 100 |
| 1999 | Apr | 12 | 242:00 | Station C | 242.2 | 100 |
| 1999 | May | 08 | 244:00 | Station B | 244.5 | 100 |
| 1999 | Jun | 04 | 246:00 | Station A | 246.8 | 100 |
| 1999 | Jul | 31 | 248:00 | Station C | 248.1 | 100 |
| 1999 | Aug | 27 | 250:00 | Station B | 250.5 | 100 |
| 1999 | Sep | 23 | 252:00 | Station A | 252.2 | 100 |
| 1999 | Oct | 19 | 254:00 | Station C | 254.5 | 100 |
| 1999 | Nov | 15 | 256:00 | Station B | 256.8 | 100 |
| 1999 | Dec | 11 | 258:00 | Station A | 258.1 | 100 |
| 2000 | Jan | 07 | 260:00 | Station C | 260.5 | 100 |
| 2000 | Feb | 03 | 262:00 | Station B | 262.2 | 100 |
| 2000 | Mar | 30 | 264:00 | Station A | 264.5 | 100 |
| 2000 | Apr | 26 | 266:00 | Station C | 266.8 | 100 |
| 2000 | May | 22 | 268:00 | Station B | 268.1 | 100 |
| 2000 | Jun | 18 | 270:00 | Station A | 270.5 | 100 |
| 2000 | Jul | 14 | 272:00 | Station C | 272.2 | 100 |
| 2000 | Aug | 10 | 274:00 | Station B | 274.5 | 100 |
| 2000 | Sep | 06 | 276:00 | Station A | 276.8 | 100 |
| 2000 | Oct | 02 | 278:00 | Station C | 278.1 | 100 |
| 2000 | Nov | 29 | 280:00 | Station B | 280.5 | 100 |
| 2000 | Dec | 25 | 282:00 | Station A | 282.2 | 100 |
| 2001 | Jan | 21 | 284:00 | Station C | 284.5 | 100 |
| 2001 | Feb | 17 | 286:00 | Station B | 286.8 | 100 |
| 2001 | Mar | 13 | 288:00 | Station A | 288.1 | 100 |
| 2001 | Apr | 09 | 290:00 | Station C | 290.5 | 100 |
| 2001 | May | 05 | 292:00 | Station B | 292.2 | 100 |
| 2001 | Jun | 01 | 294:00 | Station A | 294.5 | 100 |
| 2001 | Jul | 28 | 296:00 | Station C | 296.8 | 100 |
| 2001 | Aug | 24 | 298:00 | Station B | 298.1 | 100 |
| 2001 | Sep | 20 | 300:00 | Station A | 300.5 | 100 |
| 2001 | Oct | 16 | 302:00 | Station C | 302.2 | 100 |
| 2001 | Nov | 12 | 304:00 | Station B | 304.5 | 100 |
| 2001 | Dec | 08 | 306:00 | Station A | 306.8 | 100 |
| 2002 | Jan | 04 | 308:00 | Station C | 308.1 | 100 |
| 2002 | Feb | 01 | 310:00 | Station B | 310.5 | 100 |
| 2002 | Mar | 28 | 312:00 | Station A | 312.2 | 100 |
| 2002 | Apr | 24 | 314:00 | Station C | 314.5 | 100 |
| 2002 | May | 20 | 316:00 | Station B | 316.8 | 100 |
| 2002 | Jun | 16 | 318:00 | Station A | 318.1 | 100 |
| 2002 | Jul | 12 | 320:00 | Station C | 320.5 | 100 |
| 2002 | Aug | 08 | 322:00 | Station B | 322.2 | 100 |
| 2002 | Sep | 04 | 324:00 | Station A | 324.5 | 100 |
| 2002 | Oct | 01 | 326:00 | Station C | 326.8 | 100 |
| 2002 | Nov | 28 | 328:00 | Station B | 328.1 | 100 |
| 2002 | Dec | 24 | 330:00 | Station A | 330.5 | 100 |
| 2003 | Jan | 20 | 332:00 | Station C | 332.2 | 100 |
| 2003 | Feb | 16 | 334:00 | Station B | 334.5 | 100 |
| 2003 | Mar | 12 | 336:00 | Station A | 336.8 | 100 |
| 2003 | Apr | 08 | 338:00 | Station C | 338.1 | 100 |
| 2003 | May | 04 | 340:00 | Station B | 340.5 | 100 |
| 2003 | Jun | 01 | 342:00 | Station A | 342.2 | 100 |
| 2003 | Jul | 28 | 344:00 | Station C | 344.5 | 100 |
| 2003 | Aug | 24 | 346:00 | Station B | 346.8 | 100 |
| 2003 | Sep | 20 | 348:00 | Station A | 348.1 | 100 |
| 2003 | Oct | 16 | 350:00 | Station C | 350.5 | 100 |
| 2003 | Nov | 12 | 352:00 | Station B | 352.2 | 100 |
| 2003 | Dec | 08 | 354:00 | Station A | 354.5 | 100 |
| 2004 | Jan | 04 | 356:00 | Station C | 356.8 | 100 |
| 2004 | Feb | 01 | 358:00 | Station B | 358.1 | 100 |
| 2004 | Mar | 28 | 360:00 | Station A | 360.5 | 100 |
| 2004 | Apr | 24 | 362:00 | Station C | 362.2 | 100 |
| 2004 | May | 20 | 364:00 | Station B | 364.5 | 100 |
| 2004 | Jun | 16 | 366:00 | Station A | 366.8 | 100 |
| 2004 | Jul | 12 | 368:00 | Station C | 368.1 | 100 |
| 2004 | Aug | 08 | 370:00 | Station B | 370.5 | 100 |
| 2004 | Sep | 04 | 372:00 | Station A | 372.2 | 100 |
| 2004 | Oct | 01 | 374:00 | Station C | 374.5 | 100 |
| 2004 | Nov | 28 | 376:00 | Station B | 376.8 | 100 |
| 2004 | Dec | 24 | 378:00 | Station A | 378.1 | 100 |
| 2005 | Jan | 20 | 380:00 | Station C | 380.5 | 100 |
| 2005 | Feb | 16 | 382:00 | Station B | 382.2 | 100 |
| 2005 | Mar | 12 | 384:00 | Station A | 384.5 | 100 |
| 2005 | Apr | 08 | 386:00 | Station C | 386.8 | 100 |
| 2005 | May | 04 | 388:00 | Station B | 388.1 | 100 |
| 2005 | Jun | 01 | 390:00 | Station A | 390.5 | 100 |
| 2005 | Jul | 28 | 392:00 | Station C | 392.2 | 100 |
| 2005 | Aug | 24 | 394:00 | Station B | 394.5 | 100 |
| 2005 | Sep | 20 | 396:00 | Station A | 396.8 | 100 |
| 2005 | Oct | 16 | 398:00 | Station C | 398.1 | 100 |
| 2005 | Nov | 12 | 400:00 | Station B | 400.5 | 100 |
| 2005 | Dec | 08 | 402:00 | Station A | | |

| | | | | | | |
|----|----|----|-----|---|---|---|
| 23 | 67 | 35 | 119 | A | A | B |
| 24 | 65 | 36 | 121 | B | A | B |
| 25 | 65 | 34 | 110 | B | C | B |
| 26 | 63 | 29 | 106 | A | E | B |
| 27 | 63 | 27 | 102 | B | C | B |
| 28 | 65 | 40 | 111 | A | D | B |
| 29 | 63 | 32 | 122 | B | B | B |
| 30 | 67 | 36 | 101 | B | F | B |

Grade XII: Low Ability Level

| | | | | | | |
|----|----|----|-----|---|---|---|
| 31 | 36 | 25 | 102 | B | E | G |
| 32 | 36 | 32 | 100 | B | D | G |
| 33 | 34 | 33 | 112 | B | B | G |
| 34 | 34 | 33 | 93 | B | G | G |
| 35 | 34 | 22 | 92 | B | C | G |
| 36 | 38 | 28 | 104 | B | D | B |
| 37 | 34 | 28 | 114 | B | D | B |
| 38 | 36 | 33 | 101 | B | A | B |
| 39 | 32 | 30 | 101 | B | A | B |
| 40 | 32 | 32 | 94 | B | A | B |

Grade XI: High Ability Level

| | | | | | | |
|----|----|----|-----|---|---|---|
| 41 | 96 | 50 | 131 | H | A | G |
| 42 | 94 | 49 | 123 | H | A | G |
| 43 | 94 | 48 | 126 | H | G | G |
| 44 | 96 | 53 | 127 | H | B | G |
| 45 | 94 | 43 | 116 | A | C | G |
| 46 | 97 | 47 | 131 | A | A | B |
| 47 | 96 | 47 | 129 | A | B | B |

| | | | | | | |
|----|----|----|-----|---|---|---|
| 48 | 94 | 47 | 114 | H | B | B |
| 49 | 96 | 44 | 126 | H | A | B |
| 50 | 95 | 52 | 130 | H | D | B |

Grade XI: Mid Ability Level

| | | | | | | |
|----|----|----|-----|---|---|---|
| 51 | 64 | 29 | 112 | B | C | G |
| 52 | 64 | 31 | 125 | A | B | G |
| 53 | 64 | 32 | 102 | A | E | G |
| 54 | 66 | 32 | 116 | A | B | G |
| 55 | 68 | 38 | 133 | A | E | G |
| 56 | 64 | 30 | 108 | B | A | G |
| 57 | 62 | 28 | 123 | A | H | G |
| 58 | 66 | 32 | 122 | A | M | G |
| 59 | 66 | 35 | 116 | A | A | G |
| 60 | 66 | 31 | 112 | B | B | G |
| 61 | 66 | 30 | 111 | B | A | B |
| 62 | 66 | 30 | 107 | B | A | B |
| 63 | 64 | 38 | 119 | A | C | B |
| 64 | 62 | 35 | 115 | A | C | B |
| 65 | 68 | 34 | 114 | B | D | B |
| 66 | 64 | 32 | 108 | B | A | B |
| 67 | 62 | 34 | 112 | B | B | B |
| 68 | 62 | 37 | 119 | B | B | B |
| 69 | 64 | 33 | 123 | A | A | B |
| 70 | 68 | 33 | 95 | B | F | B |

Grade XI: Low Ability Level

| | | | | | | |
|----|----|----|-----|---|---|---|
| 71 | 33 | 28 | 106 | B | F | G |
| 72 | 35 | 29 | 105 | B | C | G |
| 73 | 35 | 23 | 97 | B | H | G |

| | | | | | | |
|----|----|----|-----|---|---|---|
| 74 | 33 | 22 | 98 | B | A | G |
| 75 | 35 | 29 | 109 | B | H | G |
| 76 | 35 | 23 | 103 | B | F | B |
| 77 | 33 | 29 | 108 | B | D | B |
| 78 | 33 | 29 | 101 | B | C | B |
| 79 | 35 | 31 | 97 | B | A | B |
| 80 | 37 | 26 | 97 | B | B | B |

Grade X: High Ability Level

| | | | | | | |
|----|----|----|-----|---|---|---|
| 81 | 95 | 46 | 135 | A | G | G |
| 82 | 97 | 48 | 125 | A | A | G |
| 83 | 93 | 48 | 123 | A | B | G |
| 84 | 95 | 47 | 120 | H | I | G |
| 85 | 97 | 49 | 129 | H | H | G |
| 86 | 95 | 47 | 128 | A | C | B |
| 87 | 95 | 48 | 131 | A | A | B |
| 88 | 97 | 52 | 124 | H | A | B |
| 89 | 95 | 51 | 132 | H | A | B |
| 90 | 95 | 52 | 127 | H | A | B |

Grade X: Mid Ability Level

| | | | | | | |
|----|----|----|-----|---|---|---|
| 91 | 62 | 37 | 113 | B | I | G |
| 92 | 62 | 35 | 110 | A | B | G |
| 93 | 66 | 36 | 114 | A | B | G |
| 94 | 68 | 31 | 111 | A | D | G |
| 95 | 66 | 32 | 112 | B | D | G |
| 96 | 66 | 35 | 114 | B | C | G |
| 97 | 62 | 33 | 109 | B | A | G |
| 98 | 62 | 33 | 96 | B | C | G |

| | | | | | | |
|-----|----|----|-----|---|---|---|
| 99 | 68 | 31 | 107 | B | B | G |
| 100 | 68 | 35 | 105 | A | F | G |
| 101 | 62 | 34 | 113 | A | A | B |
| 102 | 62 | 39 | 126 | B | A | B |
| 103 | 66 | 35 | 109 | A | A | B |
| 104 | 66 | 35 | 117 | B | D | B |
| 105 | 62 | 34 | 124 | A | B | B |
| 106 | 66 | 35 | 115 | A | H | B |
| 107 | 64 | 33 | 109 | A | B | B |
| 108 | 66 | 32 | 104 | A | L | B |
| 109 | 66 | 31 | 108 | A | B | B |
| 110 | 62 | 31 | 109 | B | G | B |

Grade X: Low Ability Level

| | | | | | | |
|-----|----|----|-----|---|---|---|
| 111 | 35 | 35 | 102 | A | C | B |
| 112 | 36 | 28 | 104 | B | I | G |
| 113 | 32 | 24 | 102 | B | A | G |
| 114 | 36 | 24 | 104 | B | K | G |
| 115 | 36 | 24 | 102 | B | J | G |
| 116 | 36 | 30 | 108 | A | A | B |
| 117 | 32 | 24 | 101 | B | B | B |
| 118 | 36 | 25 | 100 | B | N | B |
| 119 | 32 | 25 | 106 | B | G | B |
| 120 | 38 | 28 | 112 | B | C | B |

APPENDIX G



MATCHED GROUPS
(VIII AND X)

| | Grade X | | | | Grade VIII | | | |
|--------------------------|---------|------------------|------------------------|--------------|------------|------------------|------------------------|--------------|
| | Student | Laycock I. Q. | Grade VII Achvt. | Sex (B,G) | Student | Laycock I. Q. | Grade VII Achvt. | Sex (B,G) |
| High Ability Level | 81 | 135 | A | G | 121 | 134 | A | G |
| | 82 | 125 | A | G | 122 | 125 | A | G |
| | 83 | 123 | A | G | 123 | 122 | A | G |
| | 84 | 120 | H | G | 124 | 121 | H | G |
| | 85 | 129 | H | G | 125 | 128 | A | G |
| | 86 | 128 | A | B | 125 | 128 | A | B |
| | 87 | 131 | A | B | 127 | 131 | A | B |
| | 88 | 124 | A | B | 128 | 125 | A | B |
| | 89 | 132 | H | B | 129 | 132 | H | B |
| | 90 | 127 | H | B | 130 | 128 | H | B |
| Mid Ability Level | 91 | 113 | B | G | 131 | 113 | B | G |
| | 92 | 110 | A | G | 132 | 110 | A | G |
| | 93 | 114 | A | G | 133 | 115 | A | G |
| | 94 | 111 | A | G | 134 | 111 | B | G |
| | 95 | 112 | A | G | 135 | 112 | B | G |
| | 96 | 114 | B | G | 136 | 114 | B | G |
| | 97 | 109 | B | G | 137 | 109 | B | G |
| | 98 | 96 | B | G | 138 | 99 | B | G |
| | 99 | 107 | B | G | 139 | 108 | B | G |
| | 100 | 105 | A | G | 140 | 106 | B | G |
| | 101 | 113 | A | B | 141 | 114 | A | B |
| | 102 | 126 | B | B | 142 | 123 | B | B |
| | 103 | 109 | A | B | 143 | 108 | B | B |
| | 104 | 117 | B | B | 144 | 117 | B | B |
| | 105 | 124 | A | B | 145 | 124 | A | B |
| | 106 | 115 | A | B | 146 | 116 | A | B |
| | 107 | 109 | A | B | 147 | 112 | A | B |
| | 108 | 104 | A | B | 148 | 105 | B | B |
| | 109 | 108 | A | B | 149 | 107 | B | B |
| | 110 | 109 | B | B | 150 | 109 | B | B |
| Low Ability Level | 111 | 102 | A | G | 151 | 101 | A | G |
| | 112 | 104 | B | G | 152 | 105 | B | G |
| | 113 | 102 | B | G | 153 | 102 | B | G |
| | 114 | 104 | B | G | 154 | 104 | B | G |
| | 115 | 102 | B | G | 155 | 102 | B | G |
| | 116 | 108 | A | B | 156 | 109 | A | B |
| | 117 | 101 | B | B | 157 | 101 | B | B |
| | 118 | 100 | B | B | 158 | 100 | B | B |
| | 119 | 106 | B | B | 159 | 106 | B | B |
| | 120 | 112 | B | B | 160 | 113 | B | B |

1911 1912

| 1911 | | | | 1912 | | | |
|--------|------|------------------------|---------|--------|------|------------------------|---------|
| Date | | Description | | Date | | Description | |
| Jan 1 | 1911 | Balance | 100.00 | Jan 1 | 1912 | Balance | 100.00 |
| Jan 15 | 1911 | Received from A. B. C. | 50.00 | Jan 15 | 1912 | Received from A. B. C. | 50.00 |
| Jan 30 | 1911 | Received from D. E. F. | 25.00 | Jan 30 | 1912 | Received from D. E. F. | 25.00 |
| Feb 1 | 1911 | Received from G. H. I. | 75.00 | Feb 1 | 1912 | Received from G. H. I. | 75.00 |
| Feb 15 | 1911 | Received from J. K. L. | 100.00 | Feb 15 | 1912 | Received from J. K. L. | 100.00 |
| Feb 28 | 1911 | Received from M. N. O. | 150.00 | Feb 28 | 1912 | Received from M. N. O. | 150.00 |
| Mar 1 | 1911 | Received from P. Q. R. | 200.00 | Mar 1 | 1912 | Received from P. Q. R. | 200.00 |
| Mar 15 | 1911 | Received from S. T. U. | 250.00 | Mar 15 | 1912 | Received from S. T. U. | 250.00 |
| Mar 30 | 1911 | Received from V. W. X. | 300.00 | Mar 30 | 1912 | Received from V. W. X. | 300.00 |
| Apr 1 | 1911 | Received from Y. Z. A. | 350.00 | Apr 1 | 1912 | Received from Y. Z. A. | 350.00 |
| Apr 15 | 1911 | Received from B. C. D. | 400.00 | Apr 15 | 1912 | Received from B. C. D. | 400.00 |
| Apr 30 | 1911 | Received from E. F. G. | 450.00 | Apr 30 | 1912 | Received from E. F. G. | 450.00 |
| May 1 | 1911 | Received from H. I. J. | 500.00 | May 1 | 1912 | Received from H. I. J. | 500.00 |
| May 15 | 1911 | Received from K. L. M. | 550.00 | May 15 | 1912 | Received from K. L. M. | 550.00 |
| May 30 | 1911 | Received from N. O. P. | 600.00 | May 30 | 1912 | Received from N. O. P. | 600.00 |
| Jun 1 | 1911 | Received from Q. R. S. | 650.00 | Jun 1 | 1912 | Received from Q. R. S. | 650.00 |
| Jun 15 | 1911 | Received from T. U. V. | 700.00 | Jun 15 | 1912 | Received from T. U. V. | 700.00 |
| Jun 30 | 1911 | Received from W. X. Y. | 750.00 | Jun 30 | 1912 | Received from W. X. Y. | 750.00 |
| Jul 1 | 1911 | Received from Z. A. B. | 800.00 | Jul 1 | 1912 | Received from Z. A. B. | 800.00 |
| Jul 15 | 1911 | Received from C. D. E. | 850.00 | Jul 15 | 1912 | Received from C. D. E. | 850.00 |
| Jul 30 | 1911 | Received from F. G. H. | 900.00 | Jul 30 | 1912 | Received from F. G. H. | 900.00 |
| Aug 1 | 1911 | Received from I. J. K. | 950.00 | Aug 1 | 1912 | Received from I. J. K. | 950.00 |
| Aug 15 | 1911 | Received from L. M. N. | 1000.00 | Aug 15 | 1912 | Received from L. M. N. | 1000.00 |
| Aug 30 | 1911 | Received from O. P. Q. | 1050.00 | Aug 30 | 1912 | Received from O. P. Q. | 1050.00 |
| Sep 1 | 1911 | Received from R. S. T. | 1100.00 | Sep 1 | 1912 | Received from R. S. T. | 1100.00 |
| Sep 15 | 1911 | Received from U. V. W. | 1150.00 | Sep 15 | 1912 | Received from U. V. W. | 1150.00 |
| Sep 30 | 1911 | Received from X. Y. Z. | 1200.00 | Sep 30 | 1912 | Received from X. Y. Z. | 1200.00 |
| Oct 1 | 1911 | Received from A. B. C. | 1250.00 | Oct 1 | 1912 | Received from A. B. C. | 1250.00 |
| Oct 15 | 1911 | Received from D. E. F. | 1300.00 | Oct 15 | 1912 | Received from D. E. F. | 1300.00 |
| Oct 30 | 1911 | Received from G. H. I. | 1350.00 | Oct 30 | 1912 | Received from G. H. I. | 1350.00 |
| Nov 1 | 1911 | Received from J. K. L. | 1400.00 | Nov 1 | 1912 | Received from J. K. L. | 1400.00 |
| Nov 15 | 1911 | Received from M. N. O. | 1450.00 | Nov 15 | 1912 | Received from M. N. O. | 1450.00 |
| Nov 30 | 1911 | Received from P. Q. R. | 1500.00 | Nov 30 | 1912 | Received from P. Q. R. | 1500.00 |
| Dec 1 | 1911 | Received from S. T. U. | 1550.00 | Dec 1 | 1912 | Received from S. T. U. | 1550.00 |
| Dec 15 | 1911 | Received from V. W. X. | 1600.00 | Dec 15 | 1912 | Received from V. W. X. | 1600.00 |
| Dec 30 | 1911 | Received from Y. Z. A. | 1650.00 | Dec 30 | 1912 | Received from Y. Z. A. | 1650.00 |
| Jan 1 | 1912 | Received from B. C. D. | 1700.00 | Jan 1 | 1913 | Received from B. C. D. | 1700.00 |
| Jan 15 | 1912 | Received from E. F. G. | 1750.00 | Jan 15 | 1913 | Received from E. F. G. | 1750.00 |
| Jan 30 | 1912 | Received from H. I. J. | 1800.00 | Jan 30 | 1913 | Received from H. I. J. | 1800.00 |
| Feb 1 | 1912 | Received from K. L. M. | 1850.00 | Feb 1 | 1913 | Received from K. L. M. | 1850.00 |
| Feb 15 | 1912 | Received from N. O. P. | 1900.00 | Feb 15 | 1913 | Received from N. O. P. | 1900.00 |
| Feb 28 | 1912 | Received from Q. R. S. | 1950.00 | Feb 28 | 1913 | Received from Q. R. S. | 1950.00 |
| Mar 1 | 1912 | Received from T. U. V. | 2000.00 | Mar 1 | 1913 | Received from T. U. V. | 2000.00 |
| Mar 15 | 1912 | Received from W. X. Y. | 2050.00 | Mar 15 | 1913 | Received from W. X. Y. | 2050.00 |
| Mar 30 | 1912 | Received from Z. A. B. | 2100.00 | Mar 30 | 1913 | Received from Z. A. B. | 2100.00 |
| Apr 1 | 1912 | Received from C. D. E. | 2150.00 | Apr 1 | 1913 | Received from C. D. E. | 2150.00 |
| Apr 15 | 1912 | Received from F. G. H. | 2200.00 | Apr 15 | 1913 | Received from F. G. H. | 2200.00 |
| Apr 30 | 1912 | Received from I. J. K. | 2250.00 | Apr 30 | 1913 | Received from I. J. K. | 2250.00 |
| May 1 | 1912 | Received from L. M. N. | 2300.00 | May 1 | 1913 | Received from L. M. N. | 2300.00 |
| May 15 | 1912 | Received from O. P. Q. | 2350.00 | May 15 | 1913 | Received from O. P. Q. | 2350.00 |
| May 30 | 1912 | Received from R. S. T. | 2400.00 | May 30 | 1913 | Received from R. S. T. | 2400.00 |
| Jun 1 | 1912 | Received from U. V. W. | 2450.00 | Jun 1 | 1913 | Received from U. V. W. | 2450.00 |
| Jun 15 | 1912 | Received from X. Y. Z. | 2500.00 | Jun 15 | 1913 | Received from X. Y. Z. | 2500.00 |
| Jun 30 | 1912 | Received from A. B. C. | 2550.00 | Jun 30 | 1913 | Received from A. B. C. | 2550.00 |
| Jul 1 | 1912 | Received from D. E. F. | 2600.00 | Jul 1 | 1913 | Received from D. E. F. | 2600.00 |
| Jul 15 | 1912 | Received from G. H. I. | 2650.00 | Jul 15 | 1913 | Received from G. H. I. | 2650.00 |
| Jul 30 | 1912 | Received from J. K. L. | 2700.00 | Jul 30 | 1913 | Received from J. K. L. | 2700.00 |
| Aug 1 | 1912 | Received from M. N. O. | 2750.00 | Aug 1 | 1913 | Received from M. N. O. | 2750.00 |
| Aug 15 | 1912 | Received from P. Q. R. | 2800.00 | Aug 15 | 1913 | Received from P. Q. R. | 2800.00 |
| Aug 30 | 1912 | Received from S. T. U. | 2850.00 | Aug 30 | 1913 | Received from S. T. U. | 2850.00 |
| Sep 1 | 1912 | Received from V. W. X. | 2900.00 | Sep 1 | 1913 | Received from V. W. X. | 2900.00 |
| Sep 15 | 1912 | Received from Y. Z. A. | 2950.00 | Sep 15 | 1913 | Received from Y. Z. A. | 2950.00 |
| Sep 30 | 1912 | Received from B. C. D. | 3000.00 | Sep 30 | 1913 | Received from B. C. D. | 3000.00 |
| Oct 1 | 1912 | Received from E. F. G. | 3050.00 | Oct 1 | 1913 | Received from E. F. G. | 3050.00 |
| Oct 15 | 1912 | Received from H. I. J. | 3100.00 | Oct 15 | 1913 | Received from H. I. J. | 3100.00 |
| Oct 30 | 1912 | Received from K. L. M. | 3150.00 | Oct 30 | 1913 | Received from K. L. M. | 3150.00 |
| Nov 1 | 1912 | Received from N. O. P. | 3200.00 | Nov 1 | 1913 | Received from N. O. P. | 3200.00 |
| Nov 15 | 1912 | Received from Q. R. S. | 3250.00 | Nov 15 | 1913 | Received from Q. R. S. | 3250.00 |
| Nov 30 | 1912 | Received from T. U. V. | 3300.00 | Nov 30 | 1913 | Received from T. U. V. | 3300.00 |
| Dec 1 | 1912 | Received from W. X. Y. | 3350.00 | Dec 1 | 1913 | Received from W. X. Y. | 3350.00 |
| Dec 15 | 1912 | Received from Z. A. B. | 3400.00 | Dec 15 | 1913 | Received from Z. A. B. | 3400.00 |
| Dec 30 | 1912 | Received from C. D. E. | 3450.00 | Dec 30 | 1913 | Received from C. D. E. | 3450.00 |
| Jan 1 | 1913 | Received from F. G. H. | 3500.00 | Jan 1 | 1914 | Received from F. G. H. | 3500.00 |
| Jan 15 | 1913 | Received from I. J. K. | 3550.00 | Jan 15 | 1914 | Received from I. J. K. | 3550.00 |
| Jan 30 | 1913 | Received from L. M. N. | 3600.00 | Jan 30 | 1914 | Received from L. M. N. | 3600.00 |
| Feb 1 | 1913 | Received from O. P. Q. | 3650.00 | Feb 1 | 1914 | Received from O. P. Q. | 3650.00 |
| Feb 15 | 1913 | Received from R. S. T. | 3700.00 | Feb 15 | 1914 | Received from R. S. T. | 3700.00 |
| Feb 28 | 1913 | Received from U. V. W. | 3750.00 | Feb 28 | 1914 | Received from U. V. W. | 3750.00 |
| Mar 1 | 1913 | Received from X. Y. Z. | 3800.00 | Mar 1 | 1914 | Received from X. Y. Z. | 3800.00 |
| Mar 15 | 1913 | Received from A. B. C. | 3850.00 | Mar 15 | 1914 | Received from A. B. C. | 3850.00 |
| Mar 30 | 1913 | Received from D. E. F. | 3900.00 | Mar 30 | 1914 | Received from D. E. F. | 3900.00 |
| Apr 1 | 1913 | Received from G. H. I. | 3950.00 | Apr 1 | 1914 | Received from G. H. I. | 3950.00 |
| Apr 15 | 1913 | Received from J. K. L. | 4000.00 | Apr 15 | 1914 | Received from J. K. L. | 4000.00 |
| Apr 30 | 1913 | Received from M. N. O. | 4050.00 | Apr 30 | 1914 | Received from M. N. O. | 4050.00 |
| May 1 | 1913 | Received from P. Q. R. | 4100.00 | May 1 | 1914 | Received from P. Q. R. | 4100.00 |
| May 15 | 1913 | Received from S. T. U. | 4150.00 | May 15 | 1914 | Received from S. T. U. | 4150.00 |
| May 30 | 1913 | Received from V. W. X. | 4200.00 | May 30 | 1914 | Received from V. W. X. | 4200.00 |
| Jun 1 | 1913 | Received from Y. Z. A. | 4250.00 | Jun 1 | 1914 | Received from Y. Z. A. | 4250.00 |
| Jun 15 | 1913 | Received from B. C. D. | 4300.00 | Jun 15 | 1914 | Received from B. C. D. | 4300.00 |
| Jun 30 | 1913 | Received from E. F. G. | 4350.00 | Jun 30 | 1914 | Received from E. F. G. | 4350.00 |
| Jul 1 | 1913 | Received from H. I. J. | 4400.00 | Jul 1 | 1914 | Received from H. I. J. | 4400.00 |
| Jul 15 | 1913 | Received from K. L. M. | 4450.00 | Jul 15 | 1914 | Received from K. L. M. | 4450.00 |
| Jul 30 | 1913 | Received from N. O. P. | 4500.00 | Jul 30 | 1914 | Received from N. O. P. | 4500.00 |
| Aug 1 | 1913 | Received from Q. R. S. | 4550.00 | Aug 1 | 1914 | Received from Q. R. S. | 4550.00 |
| Aug 15 | 1913 | Received from T. U. V. | 4600.00 | Aug 15 | 1914 | Received from T. U. V. | 4600.00 |
| Aug 30 | 1913 | Received from W. X. Y. | 4650.00 | Aug 30 | 1914 | Received from W. X. Y. | 4650.00 |
| Sep 1 | 1913 | Received from Z. A. B. | 4700.00 | Sep 1 | 1914 | Received from Z. A. B. | 4700.00 |
| Sep 15 | 1913 | Received from C. D. E. | 4750.00 | Sep 15 | 1914 | Received from C. D. E. | 4750.00 |
| Sep 30 | 1913 | Received from F. G. H. | 4800.00 | Sep 30 | 1914 | Received from F. G. H. | 4800.00 |
| Oct 1 | 1913 | Received from I. J. K. | 4850.00 | Oct 1 | 1914 | Received from I. J. K. | 4850.00 |
| Oct 15 | 1913 | Received from L. M. N. | 4900.00 | Oct 15 | 1914 | Received from L. M. N. | 4900.00 |
| Oct 30 | 1913 | Received from O. P. Q. | 4950.00 | Oct 30 | 1914 | Received from O. P. Q. | 4950.00 |
| Nov 1 | 1913 | Received from R. S. T. | 5000.00 | Nov 1 | 1914 | Received from R. S. T. | 5000.00 |
| Nov 15 | 1913 | Received from U. V. W. | 5050.00 | Nov 15 | 1914 | Received from U. V. W. | 5050.00 |
| Nov 30 | 1913 | Received from X. Y. Z. | 5100.00 | Nov 30 | 1914 | Received from X. Y. Z. | 5100.00 |
| Dec 1 | 1913 | Received from A. B. C. | 5150.00 | Dec 1 | 1914 | Received from A. B. C. | 5150.00 |
| Dec 15 | 1913 | Received from D. E. F. | 5200.00 | Dec 15 | 1914 | Received from D. E. F. | 5200.00 |
| Dec 30 | 1913 | Received from G. H. I. | 5250.00 | Dec 30 | 1914 | Received from G. H. I. | 5250.00 |
| Jan 1 | 1914 | Received from J. K. L. | 5300.00 | Jan 1 | 1915 | Received from J. K. L. | 5300.00 |
| Jan 15 | 1914 | Received from M. N. O. | 5350.00 | Jan 15 | 1915 | Received from M. N. O. | 5350.00 |
| Jan 30 | 1914 | Received from P. Q. R. | 5400.00 | Jan 30 | 1915 | Received from P. Q. R. | 5400.00 |
| Feb 1 | 1914 | Received from S. T. U. | 5450.00 | Feb 1 | 1915 | Received from S. T. U. | 5450.00 |
| Feb 15 | 1914 | Received from V. W. X. | 5500.00 | Feb 15 | 1915 | Received from V. W. X. | 5500.00 |
| Feb 28 | 1914 | Received from Y. Z. A. | 5550.00 | Feb 28 | 1915 | Received from Y. Z. A. | 5550.00 |
| Mar 1 | 1914 | Received from B. C. D. | 5600.00 | Mar 1 | 1915 | Received from B. C. D. | 5600.00 |
| Mar 15 | 1914 | Received from E. F. G. | 5650.00 | Mar 15 | 1915 | Received from E. F. G. | 5650.00 |
| Mar 30 | 1914 | Received from H. I. J. | 5700.00 | Mar 30 | 1915 | Received from H. I. J. | 5700.00 |
| Apr 1 | 1914 | Received from K. L. M. | 5750.00 | Apr 1 | 1915 | Received from K. L. M. | 5750.00 |
| Apr 15 | 1914 | Received from N. O. P. | 5800.00 | Apr 15 | 1915 | Received from N. O. P. | 5800.00 |
| Apr 30 | 1914 | Received from Q. R. S. | 5850.00 | Apr 30 | 1915 | Received from Q. R. S. | 5850.00 |
| May 1 | 1914 | Received from T. U. V. | 5900.00 | May 1 | 1915 | Received from T. U. V. | 5900.00 |
| May 15 | 1914 | Received from W. X. Y. | 5950.00 | May 15 | 1915 | Received from W. X. Y. | 5950.00 |
| May 30 | 1914 | Received from Z. A. B. | 6000.00 | May 30 | 1915 | Received from Z. A. B. | 6000.00 |
| Jun 1 | 1914 | Received from C. D. E. | 6050.00 | Jun 1 | 1915 | Received from C. D. E. | 6050.00 |
| Jun 15 | 1914 | Received from F. G. H. | 6100.00 | Jun 15 | 1915 | Received from F. G. H. | 6100.00 |
| Jun 30 | 1914 | Received from I. J. K. | 6150.00 | Jun 30 | 1915 | Received from I. J. K. | 6150.00 |
| Jul 1 | 1914 | Received from L. M. N. | 6200.00 | Jul 1 | 1915 | Received from L. M. N. | 6200.00 |
| Jul 15 | 1914 | Received from O. P. Q. | 6250.00 | Jul 15 | 1915 | Received from O. P. Q. | 6250.00 |
| Jul 30 | 1914 | Received from R. S. T. | 6300.00 | Jul 30 | 1915 | Received from R. S. T. | 6300.00 |
| Aug 1 | 1914 | Received from U. V. W. | 6350.00 | Aug 1 | 1915 | Received from U. V. W. | 6350.00 |
| Aug 15 | 1914 | Received from X. Y. Z. | 6400.00 | Aug 15 | 1915 | Received from X. Y. Z. | 6400.00 |
| Aug 30 | 1914 | Received from A. B. C. | 6450.00 | Aug 30 | 1915 | Received from A. B. C. | 6450.00 |
| Sep 1 | 1914 | Received from D. E. F. | 6500.00 | Sep 1 | 1915 | Received from D. E. F. | 6500.00 |
| Sep 15 | 1914 | Received from G. H. I. | 6550.00 | Sep 15 | 1915 | Received from G. H. I. | 6550.00 |
| Sep 30 | 1914 | Received from J. K. L. | 6600.00 | Sep 30 | 1915 | Received from J. K. L. | 6600.00 |
| Oct 1 | 1914 | Received from M. N. O. | 6650.00 | Oct 1 | 1915 | Received from M. N. O. | 6650.00 |
| Oct 15 | | | | | | | |

APPENDIX H

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | |
|-------------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|-------|
| | | A | B | C | D | E | F | G | H | TOTAL | Marker One | | | Marker Two | Total |
| XII High | 1 | 5.5 | 4.5 | 6 | 5 | 5 | 7 | 4 | 5 | 42.0 | 64 | 84 | 5 | 5 | 10 |
| | 2 | 5.0 | 4.5 | 6 | 4 | 5 | 7 | 5 | 5 | 41.5 | 73 | 80 | 7 | 5 | 12 |
| | 3 | 6.0 | 4.5 | 7 | 5 | 5 | 7 | 5 | 5 | 44.5 | 58 | 76 | 7 | 4 | 11 |
| | 4 | 6.0 | 4.5 | 6 | 5 | 5 | 5 | 5 | 5 | 41.5 | 66 | 88 | 7 | 7 | 14 |
| | 5 | 5.5 | 4.5 | 7 | 5 | 5 | 6 | 5 | 5 | 43.0 | 74 | 88 | 6 | 5 | 11 |
| | 6 | 5.5 | 4.5 | 7 | 5 | 5 | 6 | 5 | 5 | 43.0 | 73 | 87 | 7 | 7 | 14 |
| | 7 | 5.5 | 4.5 | 5 | 5 | 5 | 4 | 5 | 5 | 39.0 | 62 | 81 | 6 | 6 | 12 |
| | 8 | 6.0 | 4.5 | 4 | 4 | 4 | 6 | 3 | 5 | 36.5 | 56 | 92 | 5 | 5 | 10 |
| | 9 | 6.0 | 4.5 | 6 | 4 | 5 | 6 | 5 | 5 | 41.5 | 57 | 89 | 5 | 6 | 11 |
| | 10 | 4.0 | 4.0 | 6 | 5 | 5 | 7 | 5 | 5 | 41.0 | 65 | 79 | 5 | 7 | 12 |
| XII Mid | 11 | 5.0 | 4.5 | 5 | 5 | 4 | 3 | 4 | 4 | 34.5 | 52 | 74 | 4 | 3 | 7 |
| | 12 | 5.5 | 4.5 | 4 | 3 | 5 | 6 | 5 | 5 | 38.0 | 53 | 76 | 3 | 6 | 9 |
| | 13 | 5.5 | 4.5 | 6 | 4 | 3 | 4 | 4 | 5 | 36.0 | 61 | 68 | 4 | 3 | 7 |
| | 14 | 2.0 | 2.5 | 2 | 1 | 3 | 4 | 4 | 5 | 23.5 | 45 | 61 | 3 | 5 | 8 |
| | 15 | 5.0 | 4.5 | 5 | 3 | 4 | 5 | 3 | 5 | 34.5 | 59 | 71 | 4 | 6 | 10 |

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | | Total |
|-------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|---|-------|
| | | A | B | C | D | E | F | G | H | Total | Marker One | | | Marker Two | | |
| | 16 | 5.0 | 4.0 | 7 | 5 | 5 | 5 | 5 | 5 | 5 | 41.0 | 63 | 77 | 6 | 4 | 10 |
| | 17 | 5.0 | 4.5 | 7 | 5 | 5 | 6 | 3 | 5 | | 40.5 | 56 | 76 | 4 | 4 | 8 |
| | 18 | 4.5 | 4.5 | 7 | 5 | 4 | 6 | 4 | 5 | | 40.0 | 49 | 66 | 4 | 3 | 7 |
| | 19 | 4.5 | 3.5 | 4 | 1 | 4 | 4 | 3 | 5 | | 29.0 | 39 | 69 | 4 | 3 | 7 |
| | 20 | 4.5 | 1.5 | 5 | 5 | 4 | 2 | 5 | 5 | | 32.0 | 38 | 42 | 4 | 3 | 7 |
| | 21 | 5.0 | 2.5 | 6 | 3 | 4 | 4 | 4 | 4 | | 32.5 | 62 | 66 | 3 | 2 | 5 |
| | 22 | 5.0 | 3.5 | 6 | 4 | 5 | 6 | 4 | 5 | | 38.5 | 52 | 76 | 2 | 2 | 4 |
| | 23 | 4.0 | 4.5 | 7 | 5 | 3 | 2 | 4 | 4 | | 33.5 | 32 | 71 | 3 | 2 | 5 |
| | 24 | 4.0 | 4.5 | 5 | 3 | 5 | 4 | 3 | 5 | | 33.5 | 54 | 80 | 2 | 5 | 7 |
| | 25 | 1.0 | 4.0 | 3 | 0 | 2 | 1 | 2 | 4 | | 17.0 | 41 | 65 | 3 | 3 | 6 |
| | 26 | 2.5 | 3.0 | 6 | 4 | 5 | 4 | 2 | 4 | | 30.5 | 42 | 64 | 3 | 3 | 6 |
| | 27 | 4.5 | 4.5 | 5 | 4 | 2 | 3 | 3 | 4 | | 30.0 | 29 | 52 | 3 | 2 | 5 |
| | 28 | 5.5 | 3.5 | 5 | 5 | 5 | 7 | 5 | 4 | | 40.0 | 40 | 73 | 4 | 3 | 7 |
| | 29 | 6.0 | 4.5 | 6 | 5 | 5 | 7 | 5 | 5 | | 43.5 | 49 | 69 | 3 | 4 | 7 |
| | 30 | 5.5 | 1.5 | 2 | 4 | 5 | 3 | 4 | 5 | | 30.0 | 54 | 62 | 2 | 3 | 5 |

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | | Total |
|------------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|----|-------|
| | | A | B | C | D | E | F | G | H | Total | Marker One | | | Marker Two | | |
| XII Low | 31 | 2.0 | 3.0 | 1 | 4 | 3 | 3 | 4 | 2 | 22.0 | 49 | 38 | 5 | 3 | 8 | |
| | 32 | 4.5 | 1.5 | 3 | 3 | 2 | 5 | 3 | 5 | 27.0 | 44 | 53 | 2 | 3 | 5 | |
| | 33 | 5.5 | 4.0 | 5 | 4 | 5 | 3 | 2 | 5 | 33.5 | 60 | 57 | 5 | 5 | 10 | |
| | 34 | 1.5 | 2.5 | 5 | 5 | 5 | 4 | 5 | 4 | 32.0 | 41 | 66 | 4 | 5 | 9 | |
| | 35 | 2.0 | 3.5 | 4 | 5 | 4 | 5 | 3 | 2 | 28.5 | 55 | 49 | 3 | 3 | 6 | |
| | 36 | 5.5 | 3.0 | 5 | 4 | 5 | 5 | 3 | 2 | 32.5 | 43 | 60 | 4 | 2 | 6 | |
| | 37 | 2.0 | 4.5 | 1 | 3 | 2 | 4 | 4 | 5 | 25.5 | 42 | 56 | 3 | 2 | 5 | |
| | 38 | 6.0 | 4.0 | 4 | 5 | 3 | 6 | 4 | 4 | 36.0 | 57 | 66 | 3 | 3 | 6 | |
| | 39 | 4.5 | 4.0 | 4 | 2 | 3 | 4 | 4 | 5 | 30.5 | 59 | 60 | 3 | 4 | 7 | |
| | 40 | 5.5 | 4.0 | 4 | 2 | 4 | 3 | 2 | 0 | 24.5 | 59 | 64 | 3 | 1 | 4 | |
| XI High | 41 | 6.0 | 2.5 | 6 | 5 | 5 | 6 | 5 | 5 | 40.5 | 67 | 76 | 6 | 5 | 11 | |
| | 42 | 6.0 | 4.5 | 7 | 5 | 5 | 7 | 5 | 5 | 44.5 | 60 | 66 | 5 | 4 | 9 | |
| | 43 | 4.0 | 4.5 | 4 | 5 | 4 | 6 | 4 | 5 | 36.5 | 58 | 83 | 4 | 5 | 9 | |
| | 44 | 5.5 | 4.5 | 6 | 5 | 4 | 5 | 5 | 5 | 40.0 | 66 | 81 | 7 | 4 | 11 | |
| | 45 | 5.5 | 4.0 | 5 | 3 | 5 | 4 | 5 | 5 | 36.5 | 64 | 79 | 5 | 4 | 9 | |

| | | |
|-----|-----|-----|
| 第一節 | 第一節 | 第一節 |
| 第二節 | 第二節 | 第二節 |
| 第三節 | 第三節 | 第三節 |

| | | |
|-----|-----|-----|
| 第四節 | 第四節 | 第四節 |
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| | | |
|-----|-----|-----|
| 第五節 | 第五節 | 第五節 |
|-----|-----|-----|

| | | |
|------|------|------|
| 第六節 | 第六節 | 第六節 |
| 第七節 | 第七節 | 第七節 |
| 第八節 | 第八節 | 第八節 |
| 第九節 | 第九節 | 第九節 |
| 第十節 | 第十節 | 第十節 |
| 第十一節 | 第十一節 | 第十一節 |
| 第十二節 | 第十二節 | 第十二節 |
| 第十三節 | 第十三節 | 第十三節 |
| 第十四節 | 第十四節 | 第十四節 |
| 第十五節 | 第十五節 | 第十五節 |

| | | |
|------|------|------|
| 第十六節 | 第十六節 | 第十六節 |
| 第十七節 | 第十七節 | 第十七節 |
| 第十八節 | 第十八節 | 第十八節 |
| 第十九節 | 第十九節 | 第十九節 |
| 第二十節 | 第二十節 | 第二十節 |

大正十一年

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | | Total |
|-----------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|---|-------|
| | | A | B | C | D | E | F | G | H | Total | Marker One | | | Marker Two | | |
| | 46 | 5.0 | 4.5 | 6 | 5 | 5 | 6 | 5 | 5 | 5 | 41.5 | 59 | 86 | 6 | 5 | 11 |
| | 47 | 4.5 | 4.5 | 6 | 4 | 3 | 6 | 4 | 5 | 5 | 37.0 | 52 | 87 | 3 | 4 | 7 |
| | 48 | 5.5 | 3.5 | 5 | 1 | 3 | 4 | 4 | 5 | 5 | 31.0 | 58 | 76 | 4 | 4 | 8 |
| | 49 | 4.5 | 4.0 | 5 | 5 | 3 | 4 | 4 | 4 | 4 | 33.5 | 63 | 78 | 4 | 3 | 7 |
| | 50 | 5.0 | 4.5 | 7 | 5 | 5 | 7 | 5 | 5 | 5 | 43.5 | 70 | 89 | 3 | 3 | 6 |
| XI Mid | 51 | 4.5 | 4.5 | 6 | 5 | 4 | 6 | 4 | 5 | 5 | 39.0 | 41 | 68 | 5 | 5 | 10 |
| | 52 | 5.5 | 4.5 | 6 | 4 | 3 | 7 | 4 | 5 | 5 | 39.0 | 57 | 52 | 5 | 5 | 10 |
| | 53 | 4.5 | 4.5 | 4 | 3 | 5 | 5 | 4 | 5 | 5 | 35.0 | 53 | 63 | 5 | 4 | 9 |
| | 54 | 2.5 | 3.0 | 7 | 3 | 4 | 5 | 5 | 4 | 5 | 33.5 | 43 | 62 | 3 | 4 | 7 |
| | 55 | 6.0 | 4.5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 39.5 | 66 | 70 | 4 | 3 | 7 |
| | 56 | 5.5 | 4.5 | 6 | 4 | 5 | 3 | 5 | 5 | 5 | 38.0 | 42 | 64 | 4 | 2 | 6 |
| | 57 | 4.5 | 3.5 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 36.0 | 45 | 48 | 4 | 5 | 9 |
| | 58 | 5.0 | 4.5 | 5 | 5 | 4 | 7 | 4 | 5 | 5 | 39.5 | 61 | 67 | 3 | 3 | 6 |
| | 59 | 5.5 | 3.5 | 5 | 3 | 3 | 6 | 3 | 5 | 5 | 34.0 | 56 | 64 | 4 | 3 | 7 |
| | 60 | 4.0 | 4.0 | 4 | 5 | 4 | 4 | 4 | 5 | 5 | 34.0 | 43 | 55 | 4 | 4 | 8 |

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | |
|-----------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|-------|
| | | A | B | C | D | E | F | G | H | Total | Marker One | | | Marker Two | Total |
| | 61 | 4.5 | 3.5 | 5 | 5 | 2 | 4 | 4 | 5 | 33.0 | 38 | 57 | 4 | 3 | 7 |
| | 62 | 4.0 | 1.0 | 3 | 2 | 4 | 3 | 4 | 1 | 22.0 | 35 | 58 | 3 | 3 | 6 |
| | 63 | 6.0 | 4.5 | 5 | 5 | 5 | 4 | 3 | 5 | 37.5 | 57 | 65 | 3 | 3 | 6 |
| | 64 | 5.5 | 4.5 | 5 | 5 | 4 | 3 | 5 | 4 | 36.0 | 70 | 71 | 4 | 4 | 8 |
| | 65 | 5.5 | 4.5 | 5 | 2 | 1 | 4 | 4 | 5 | 31.0 | 50 | 71 | 3 | 4 | 7 |
| | 66 | 5.5 | 4.0 | 4 | 4 | 3 | 4 | 3 | 5 | 32.5 | 27 | 58 | 3 | 1 | 4 |
| | 67 | 5.5 | 4.5 | 4 | 5 | 5 | 5 | 5 | 5 | 39.0 | 43 | 64 | 6 | 6 | 12 |
| | 68 | 6.0 | 4.5 | 6 | 5 | 5 | 5 | 3 | 3 | 37.5 | 44 | 74 | 4 | 3 | 7 |
| | 69 | 4.0 | 4.5 | 5 | 3 | 5 | 6 | 5 | 4 | 36.5 | 43 | 59 | 3 | 1 | 4 |
| | 70 | 1.5 | 4.5 | 4 | 3 | 4 | 2 | 4 | 4 | 27.0 | 42 | 72 | 3 | 2 | 5 |
| XI Low | 71 | 2.5 | 4.0 | 5 | 4 | 5 | 6 | 3 | 5 | 34.5 | 51 | 52 | 3 | 2 | 5 |
| | 72 | 3.5 | 3.0 | 6 | 2 | 2 | 3 | 3 | 5 | 26.5 | 51 | 67 | 3 | 3 | 6 |
| | 73 | 5.0 | 1.0 | 3 | 4 | 4 | 2 | 4 | 0 | 23.0 | 43 | 53 | 3 | 4 | 7 |
| | 74 | 1.5 | 4.5 | 4 | 5 | 5 | 3 | 2 | 2 | 27.0 | 54 | 54 | 4 | 3 | 7 |
| | 75 | 3.0 | 4.5 | 7 | 1 | 3 | 4 | 3 | 3 | 28.5 | 52 | 52 | 3 | 4 | 7 |

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | | Total |
|-----------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|----|-------|
| | | A | B | C | D | E | F | G | H | Total | Marker One | | | Marker Two | | |
| | 76 | 5.0 | 4.5 | 6 | 3 | 4 | 5 | 3 | 5 | 35.5 | 63 | 62 | 4 | 3 | 7 | |
| | 77 | 4.5 | 4.0 | 5 | 4 | 3 | 4 | 4 | 4 | 32.5 | 34 | 63 | 3 | 2 | 5 | |
| | 78 | 5.5 | 4.5 | 5 | 4 | 5 | 3 | 3 | 5 | 35.0 | 55 | 60 | 2 | 3 | 5 | |
| | 79 | 4.5 | 4.0 | 4 | 4 | 5 | 5 | 2 | 5 | 33.5 | 31 | 70 | 4 | 2 | 6 | |
| | 80 | 1.5 | 4.0 | 2 | 2 | 1 | 1 | 1 | 1 | 13.5 | 52 | 57 | 3 | 2 | 5 | |
| X High | 81 | 6.0 | 4.5 | 5 | 5 | 4 | 7 | 5 | 5 | 41.5 | 65 | 65 | 4 | 4 | 8 | |
| | 82 | 5.5 | 4.5 | 4 | 4 | 5 | 2 | 5 | 5 | 35.0 | 59 | 81 | 5 | 4 | 9 | |
| | 83 | 3.0 | 4.5 | 6 | 5 | 4 | 3 | 4 | 5 | 34.5 | 69 | 78 | 4 | 4 | 8 | |
| | 84 | 5.0 | 4.5 | 6 | 4 | 5 | 7 | 5 | 5 | 41.5 | 76 | 73 | 4 | 4 | 8 | |
| | 85 | 6.0 | 4.0 | 5 | 5 | 5 | 4 | 4 | 5 | 38.0 | 48 | 73 | 4 | 5 | 9 | |
| | 86 | 6.0 | 4.5 | 6 | 5 | 5 | 7 | 5 | 5 | 43.5 | 57 | 73 | 3 | 4 | 7 | |
| | 87 | 5.0 | 4.5 | 7 | 5 | 4 | 6 | 3 | 5 | 39.5 | 68 | 70 | 5 | 4 | 9 | |
| | 88 | 5.5 | 4.5 | 7 | 5 | 4 | 7 | 5 | 5 | 43.0 | 78 | 81 | 5 | 4 | 9 | |
| | 89 | 6.0 | 4.5 | 7 | 5 | 4 | 6 | 4 | 5 | 41.5 | 63 | 83 | 5 | 4 | 9 | |
| | 90 | 6.0 | 4.5 | 5 | 5 | 4 | 6 | 4 | 5 | 39.5 | 62 | 90 | 5 | 5 | 10 | |

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | |
|----------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|-------|
| | | A | B | C | D | E | F | G | H | Total | Marker One | | | Marker Two | Total |
| X Mid | 91 | 5.0 | 4.5 | 5 | 5 | 5 | 6 | 5 | 5 | 40.5 | 41 | 64 | 4 | 4 | 8 |
| | 92 | 5.0 | 4.5 | 4 | 3 | 5 | 2 | 3 | 5 | 31.5 | 46 | 61 | 4 | 4 | 8 |
| | 93 | 6.0 | 4.0 | 6 | 5 | 4 | 6 | 4 | 4 | 39.0 | 48 | 61 | 2 | 2 | 4 |
| | 94 | 5.0 | 4.0 | 4 | 5 | 3 | 4 | 4 | 5 | 34.0 | 36 | 48 | 3 | 5 | 8 |
| | 95 | 5.5 | 4.0 | 4 | 2 | 5 | 3 | 4 | 5 | 32.5 | 37 | 75 | 4 | 4 | 8 |
| | 96 | 3.0 | 4.0 | 4 | 5 | 4 | 5 | 4 | 5 | 34.0 | 48 | 59 | 4 | 4 | 8 |
| | 97 | 5.5 | 4.5 | 5 | 1 | 2 | 6 | 5 | 5 | 34.0 | 47 | 55 | 5 | 5 | 10 |
| | 98 | 4.0 | 4.5 | 2 | 0 | 2 | 4 | 4 | 5 | 25.5 | 43 | 54 | 4 | 5 | 9 |
| | 99 | 3.5 | 4.0 | 4 | 3 | 4 | 3 | 3 | 5 | 29.5 | 39 | 52 | 4 | 3 | 7 |
| | 100 | 6.0 | 2.5 | 6 | 5 | 5 | 6 | 5 | 4 | 39.5 | 46 | 41 | 4 | 3 | 7 |
| | 101 | 3.0 | 3.5 | 5 | 2 | 4 | 4 | 3 | 4 | 28.5 | 39 | 58 | 2 | 3 | 5 |
| | 102 | 4.0 | 4.5 | 6 | 5 | 4 | 6 | 4 | 5 | 38.5 | 36 | 57 | 4 | 4 | 8 |
| | 103 | 4.5 | 4.5 | 3 | 3 | 3 | 4 | 4 | 5 | 31.0 | 48 | 66 | 3 | 2 | 5 |
| | 104 | 5.0 | 3.0 | 3 | 5 | 3 | 4 | 3 | 5 | 31.0 | 44 | 73 | 3 | 3 | 6 |
| | 105 | 4.5 | 4.5 | 0 | 5 | 4 | 5 | 3 | 4 | 30.0 | 43 | 57 | 3 | 3 | 6 |

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | |
|----------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|-------|
| | | A | B | C | D | E | F | G | H | Total | Marker One | | | Marker "wo | Total |
| | 106 | 4.5 | 3.5 | 5 | 3 | 3 | 4 | 2 | 4 | 29.0 | 32 | 71 | 4 | 3 | 7 |
| | 107 | 2.5 | 4.0 | 4 | 2 | 2 | 2 | 2 | 3 | 21.5 | 42 | 52 | 3 | 4 | 7 |
| | 108 | 5.5 | 3.5 | 5 | 2 | 3 | 2 | 3 | 5 | 29.0 | 35 | 46 | 2 | 2 | 4 |
| | 109 | 4.5 | 3.5 | 3 | 4 | 3 | 5 | 4 | 2 | 29.0 | 64 | 49 | 2 | 2 | 4 |
| | 110 | 3.5 | 4.5 | 4 | 1 | 4 | 4 | 2 | 5 | 28.0 | 36 | 64 | 3 | 2 | 5 |
| X Low | 111 | 5.5 | 4.5 | 3 | 4 | 3 | 4 | 4 | 5 | 33.0 | 50 | 57 | 4 | 5 | 9 |
| | 112 | 2.5 | 4.5 | 5 | 4 | 4 | 3 | 4 | 5 | 32.0 | 37 | 44 | 3 | 3 | 6 |
| | 113 | 0.0 | 2.0 | 3 | 3 | 1 | 5 | 2 | 4 | 20.0 | 30 | 33 | 3 | 2 | 5 |
| | 114 | 3.0 | 3.5 | 2 | 4 | 5 | 2 | 4 | 5 | 28.5 | 31 | 55 | 2 | 2 | 4 |
| | 115 | 3.0 | 4.5 | 5 | 4 | 5 | 2 | 3 | 5 | 31.5 | 47 | 52 | 2 | 4 | 6 |
| | 116 | 4.0 | 3.5 | 6 | 5 | 4 | 4 | 2 | 5 | 33.5 | 46 | 59 | 3 | 2 | 5 |
| | 117 | 5.5 | 4.5 | 1 | 1 | 2 | 3 | 4 | 5 | 26.0 | 40 | 55 | 2 | 3 | 5 |
| | 118 | 5.0 | 2.0 | 5 | 2 | 1 | 4 | 2 | 5 | 26.0 | 37 | 68 | 2 | 3 | 5 |
| | 119 | 2.0 | 2.5 | 1 | 2 | 3 | 3 | 1 | 2 | 16.5 | 36 | 58 | 3 | 2 | 5 |
| | 120 | 2.0 | 3.5 | 4 | 2 | 3 | 3 | 2 | 4 | 23.5 | 41 | 48 | 3 | 3 | 6 |

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | | Total |
|--------------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|--|-------|
| | | A | B | C | D | E | F | G | H | Total | Marker One | | | Marker Two | | |
| VIII High | 121 | 6.0 | 4.5 | 6 | 4 | 4 | 6 | 5 | 5 | 5 | 40.5 | | | | | |
| | 122 | 2.5 | 3.5 | 4 | 4 | 5 | 5 | 3 | 5 | 5 | 32.0 | | | | | |
| | 123 | 3.5 | 4.0 | 5 | 2 | 2 | 4 | 2 | 5 | 5 | 27.5 | | | | | |
| | 124 | 5.5 | 4.5 | 5 | 3 | 5 | 4 | 5 | 5 | 5 | 37.0 | | | | | |
| | 125 | 5.5 | 4.5 | 4 | 2 | 5 | 2 | 6 | 4 | 4 | 33.0 | | | | | |
| | 126 | 4.5 | 4.5 | 4 | 2 | 3 | 4 | 3 | 2 | 2 | 27.0 | | | | | |
| | 127 | 4.5 | 4.0 | 4 | 5 | 4 | 3 | 5 | 4 | 4 | 33.5 | | | | | |
| | 128 | 3.0 | 4.5 | 3 | 2 | 4 | 2 | 6 | 5 | 5 | 29.5 | | | | | |
| | 129 | 5.5 | 4.5 | 4 | 5 | 5 | 7 | 6 | 5 | 5 | 42.0 | | | | | |
| | 130 | 5.0 | 4.5 | 3 | 1 | 4 | 2 | 4 | 5 | 5 | 28.5 | | | | | |
| VIII Mid | 131 | 2.0 | 4.5 | 1 | 3 | 2 | 4 | 5 | 5 | 5 | 26.5 | | | | | |
| | 132 | 4.5 | 4.5 | 5 | 2 | 3 | 3 | 3 | 4 | 4 | 29.0 | | | | | |
| | 133 | 5.5 | 4.5 | 5 | 2 | 5 | 4 | 4 | 4 | 4 | 34.0 | | | | | |
| | 134 | 2.5 | 4.0 | 3 | 3 | 2 | 4 | 4 | 5 | 5 | 27.5 | | | | | |
| | 135 | 5.5 | 4.0 | 0 | 2 | 3 | 1 | 2 | 1 | 1 | 18.5 | | | | | |

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | | Total |
|-------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|--|-------|
| | | A | B | C | D | E | F | G | H | Total | Marker One | | | Marker Two | | |
| | 136 | 5.0 | 3.5 | 4 | 3 | 4 | 7 | 4 | 3 | 33.5 | | | | | | |
| | 137 | 2.0 | 4.0 | 2 | 4 | 3 | 3 | 4 | 4 | 26.0 | | | | | | |
| | 138 | 3.0 | 2.0 | 5 | 2 | 3 | 4 | 3 | 4 | 26.0 | | | | | | |
| | 139 | 6.0 | 3.5 | 5 | 2 | 2 | 1 | 0 | 0 | 19.5 | | | | | | |
| | 140 | 2.0 | 2.0 | 5 | 2 | 2 | 5 | 2 | 2 | 22.0 | | | | | | |
| | 141 | 4.0 | 3.5 | 6 | 4 | 5 | 4 | 4 | 1 | 31.5 | | | | | | |
| | 142 | 0.5 | 4.0 | 3 | 4 | 4 | 2 | 2 | 5 | 24.5 | | | | | | |
| | 143 | 2.5 | 4.0 | 4 | 1 | 2 | 3 | 5 | 1 | 22.5 | | | | | | |
| | 144 | 1.5 | 1.0 | 2 | 1 | 2 | 1 | 0 | 3 | 11.5 | | | | | | |
| | 145 | 5.0 | 4.5 | 6 | 3 | 4 | 6 | 5 | 1 | 34.5 | | | | | | |
| | 146 | 1.5 | 2.5 | 2 | 3 | 2 | 3 | 4 | 5 | 23.0 | | | | | | |
| | 147 | 2.0 | 3.5 | 2 | 2 | 2 | 4 | 4 | 0 | 19.5 | | | | | | |
| | 148 | 1.0 | 4.5 | 3 | 4 | 2 | 4 | 3 | 3 | 24.5 | | | | | | |
| | 149 | 1.5 | 2.0 | 1 | 2 | 0 | 0 | 3 | 0 | 9.5 | | | | | | |
| | 150 | 4.5 | 2.0 | 4 | 3 | 2 | 3 | 2 | 3 | 23.5 | | | | | | |

RAW SCORES ON ALL TESTS

| GROUP | STUDENT | TRANSFORMATIONAL GRAMMAR TEST | | | | | | | | | | TRADITIONAL GRAMMAR TEST | ANALOGIES TEST | ESSAY TEST | | Total |
|-------------|---------|-------------------------------|-----|---|---|---|---|---|---|-------|------------|--------------------------|----------------|------------|--|-------|
| | | A | B | C | D | E | F | G | H | Total | Marker One | | | Marker Two | | |
| VIII Low | 151 | 0.5 | 2.5 | 3 | 3 | 5 | 3 | 4 | 3 | | | | | | | |
| | 152 | 2.5 | 3.5 | 3 | 1 | 3 | 3 | 3 | 1 | | | | | | | |
| | 153 | 3.5 | 2.0 | 3 | 2 | 3 | 2 | 2 | 3 | | | | | | | |
| | 154 | 5.5 | 3.5 | 4 | 4 | 5 | 4 | 4 | 0 | | | | | | | |
| | 155 | 3.0 | 2.5 | 6 | 4 | 5 | 3 | 6 | 5 | | | | | | | |
| | 156 | 4.0 | 4.0 | 4 | 2 | 1 | 2 | 1 | 2 | | | | | | | |
| | 157 | 5.5 | 4.5 | 4 | 3 | 4 | 5 | 4 | 0 | | | | | | | |
| | 158 | 3.5 | 3.5 | 3 | 2 | 3 | 0 | 3 | 0 | | | | | | | |
| | 159 | 3.0 | 2.5 | 0 | 1 | 2 | 2 | 0 | 1 | | | | | | | |
| | 160 | 0.5 | 4.5 | 5 | 3 | 3 | 4 | 1 | 5 | | | | | | | |

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